

Harold Humph
ANSWER BOOK
FOR
ELEMENTARY ALGEBRA

BY
EDWARD I. EDGERTON
AND
PERRY A. CARPENTER

ALLYN AND BACON

BOSTON	NEW YORK	CHICAGO
ATLANTA	SAN FRANCISCO	DALLAS

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ANSWER BOOK

FOR

ELEMENTARY ALGEBRA

Page xxxviii

1. \$14. 2. \$14. 3. \$720.

Page xxxix

4. \$700. 5. $280\frac{7}{11}$; 280; 260. 6. 70 to 80; About 30.

Page xl

1. \$800; \$100; 2¢. 2. \$1733.17; #3. 3. \$1157.24.
 4. J, \$17.60; Br, \$20.50; Be, \$25.20; R, \$9.50; Total, \$72.80.
 Number of hours.

Page 3

1. $6x$. 2. ab . 3. $x + 5$. 4. $m + n$.

Page 4

5. $x - y$. 10. abc . 15. $c = 7np$. 20. $x - y = 6n$.
 6. $m - n$. 11. $\frac{2}{a}$. 16. $\frac{x + y}{2}$. 21. lw .
 7. $n - m$. 12. $\frac{a}{2}$. 17. $cd - ab$. 22. bh .
 8. ax . 13. $A = lw$. 18. $\frac{m}{n} + \frac{p}{q}$. 23. $2l + 2w$.
 9. $9xy$. 14. $P = 2w + 2l$. 19. $5a = 3b$. 24. $8n$.
 25. $n + 5$.
 26. $2n = 10$.
 27. The sum of 6 and 7.
 28. The sum of 7 and x .
 29. The sum of x and y .
 30. Subtract 7 from 9.
 31. The product of l , w , and h .

32. Twice l added to twice w .
33. Seven times the sum of a and b .
34. Five times the square root of the sum of x and y .
35. The result of subtracting b from a .
36. Twice the product of a and c .
37. x divided by 2.
38. The sum of x and twice y .
39. The sum of m and n divided by 2.
40. a equals twice c .
41. The sum of m and n equals the product of a and b .
42. m divided by n equals x divided by y .
43. Two times n equals 12.

Page 7

- | | | |
|------------------------|-----------------------------|-----------------------------|
| 1. $C = \pi d$. | 5. $p = ns$. | 9. $W = 10 p$. |
| 2. $v = 32 t$. | 6. $v = lwh$. | 10. $W = 62\frac{1}{2} n$. |
| 3. $r = \frac{d}{t}$. | 7. $d = 1.414 s$. | 11. $O = 16 p$. |
| 4. $c = np$. | 8. $R = 12 r$. | 13. $A = \frac{1}{2} bh$. |
| | 14. $A = \frac{m + n}{2}$. | |

Page 8

- | | | |
|----------------------------|--|---------------------------|
| 15. $m = 12 y$. | 17. $r = 320 m$. | 19. $p = \frac{o}{16}$. |
| 16. $C = 100 d$. | 18. $A = \frac{lw}{160}$. | 20. $d = \frac{c}{\pi}$. |
| 21. $n = \frac{10 d}{2}$. | 22. $s = 6 e \cdot e$ or $s = 6 e^2$. | |

Page 9

1. (a) 500; (b) 1000; (c) 500; (d) 31.25; (e) $\frac{1}{8}$; (f) $14\frac{5}{8}$.
2. (a) 42; (b) 84; (c) 126; (d) 84; (e) 168; (f) 378.
(g) Doubled; (h) Trebled; (i) Doubled; (j) Quadrupled;
(k) Multiplied by 9.

Page 10

3. (a) 10.725; (b) 21.45; (c) 343.2; (d) 21.45; (e) 8.9375;
(f) 223.4375.
4. (1) 65; (2) 37; (3) 12; (4) 10.3.
5. 15; 30; 45; 60; Doubled; Trebled; Quadrupled; The side.
6. (a) 52; (b) 88; (c) 124; (d) 44; (e) 104; (f) 156; (g) Doubled;
(h) Trebled; Length and width.

Page 11

7. (a) 60; (b) 120; (c) 120; (d) 240; (e) Doubled; (f) Doubled; (g) Quadrupled.
 8. (a) 50; (b) 200; (c) 450; (d) 1250.
 9. (a) Quadrupled; (b) Doubled; (c) Doubled.
 10. (a) 60; (b) 120; (c) 50.

Page 12

1. (a) \$1.28; (b) \$2.56; (c) \$3.84; (d) \$2.56; (e) \$5.12; (f) \$11.52; (g) Doubled; (h) Trebled; (i) Doubled; (j) Quadrupled; (k) Multiplied by 9
 2. s.p. = $c + g$.
 (a) 18¢ (b) 15¢ (c) 12¢ (d) 20¢
 (e) 21¢ (f) 25¢ (g) Decreased
 (h) Increased. s.p. = $c - l$.

Page 13

3. n.p. = $g \cdot p - d$.
 (a) 81¢ (b) 71¢ (c) 83¢ (d) 80¢
 (e) Decreased (f) Increased.
 4. $c + g = a - d$.
 6. \$48; Double it. Time is doubled while p and r remain the same. The time.
 7. (a) \$312; (b) \$624; (c) \$156; (d) \$1248.
 (b) is double (a); (c) is half of (a); (d) is 4 times (a).

Page 14

8. (a) t ; (b) t ; (c) f ; (d) f ; (e) t .

Page 14

1. (a) 400; (b) 200; (c) 200; (d) 1600; (e) Halved; (f) Halved; (g) Quadrupled.

Page 15

2. (a) 120; (b) 240; (c) 175; (d) 87.5; (e) 175.
 3. (a) 25; (b) 50; (c) 50; (d) 25;
 (e) 48.17; (f) 40; (g) 44.23; (h) 38;
 (i) Doubled; (j) Doubled; (k) Unchanged.

Page 16

4. (a) 25.6; (b) 12.8; (c) 6.4; (d) 12.8; (e) 6.4; (f) 25.6.

Page 16

1. 16 in.; 32 in.; 64 in.; 42 in.; 10 in.; 25 cm.; increases.
2. 25 sq. ft.; 100 sq. ft.; 400 sq. ft.; 81 sq. in.; 144 sq. m.; Yes.
If s is doubled, A is quadrupled. If s is quadrupled A is multiplied by 16.
3. 48; 144; 240; $48n$. Length of wire equals 4 times the number of strands times the length of each side.

Page 17

4. 25; y = number of sq. yds.; a^2 = area of floor in sq. ft.
5. $A = lw$; $p = 2l + 2w$.
6. Area of floor in sq. ft.; Area of rug in sq. ft.; Area of uncovered floor.
7. $ab - c^2$; $\frac{ab - c^2}{9}$.
8. 3.1416 or $\frac{22}{7}$ (approx.); 3.1; 3.14.
9. (a) 44 in.; (b) 88 in.;
(c) 132 in.; (d) 308 in.; Doubled; Trebled;
Areas — (a) 154 sq. in.; (b) 616 sq. in.; (c) 1386 sq. in.; (d) 7546 sq. in. If r is doubled, A is quadrupled. If r is trebled, A is multiplied by 9. If r is multiplied by 7, A is multiplied by 49.

Page 18

- | | | | |
|---------------|--------------|------------|-----------------------|
| 11. (a) 38.5; | (b) 55.44; | (c) 581.3; | (d) $17\frac{1}{3}$. |
| 12. 2400. | 13. 35. | 14. 18. | 15. 3600. |
| 16. 7200. | 17. Doubled. | 18. 440. | |

Page 19

- | | | | |
|-----------------|---------|----------------|----------------|
| 19. 880. | 22. 64. | 25. 6. | 28. 20. |
| 20. 1760. | 23. 12. | 26. Decreases. | 29. 40. |
| 21. Quadrupled. | 24. 12. | 27. 10. | 30. Increases. |

Practice Test. Pages 19 and 20

- | | | | |
|-----------------|------------------|--------------------|--------------------|
| 1. $A = 20$. | 3. $I = \$175$. | 5. $A = 17.5104$. | 7. $A = 117$. |
| 2. $V = 7200$. | 4. $A = 12.25$. | 6. $C = 88$. | 8. $s = \$30.90$. |
| 9. $A = 154$. | | 10. $K = 421.9+$. | |

Page 21

1. 240 mi.

Page 22

5. The time. Increased. Decreased.
6. Number of gallons. Increased. Decreased.
7. The price. Decreased. Increased.
8. The number of miles. Increased. Decreased.
9. r . Increased. Decreased.
10. The base and the altitude.

Review

2. $100d + 25q + c$.

Page 23

3. $D = dq + R$.
4. The side
5. Distance from stove.
6. Number sold. Decrease.
7. Distance from it.

Page 25

1. Under 6; \$1.20.
2. Over \$1.60; 8.
3. \$4.00.
4. Increases.
5. $C = $.18n$.

6.	3	4	7	8	10
	\$36	\$48	\$84	\$96	\$120
	Increases. Weeks.				

Page 26

7. $W = 12w$.
8. \$6.50; \$13; $s = $.25w$.
9. Increases; $C = $.06n$; $C = $.07n$; $C = $.08n$.
10. Increases; $D = 40t$; $D = 50t$; $D = 25t$.

Page 27

11. Increases. Increases.
12. Doubled. Trebled. Quadrupled.
13. Doubled. Trebled. Quadrupled. Multiplied by 8. Multiplied by 32. $A = lw$.

Page 28

14. Decreases. $A = s^2$. Square root of area.

Page 29

1. 1¢ a pound.

$C = 6 + w$ or $C = 7\text{¢} + a$ 1¢ , if a = additional pounds above first pound.

2. $y = 2x$.

3. $b = 3a$.

Page 30

4. $y = 4x$.

8. $z = x + y$.

5. $y = x + 1$.

9. $A = bh$.

6. $y = 2x + 1$.

10. $A = \frac{1}{2}bh$.

7. $y = 3x - 1$.

Page 33

1. 4 hrs.; $3\frac{1}{3}$ hrs.; $1\frac{1}{3}$ hrs.

Page 34

2. $1\frac{1}{2}$ hrs.; $2\frac{1}{2}$ hrs.; 3.2 hrs.

3. $5\frac{2}{5}$ hrs.; $1\frac{3}{5}$ hrs.; $\frac{3}{5}$ hrs.

4. 7.5 mi.; 9.3 mi.; 12.6 mi.

5. 17.5 mi.; 35 mi.; 27 mi.

6. 42.5 mi.; 57.5 mi.; $83\frac{1}{3}$ mi.

Page 36

6. \$1.25; \$3.50. 7 hours. Doubled. Trebled.

7. Doubled. Trebled. Decreased.

8. \$.50.

9. (c) $2\frac{1}{2}$ hours.

Page 38

1. $\frac{1}{2}xy$.

5. $\frac{a}{x} + \frac{b}{y}$.

9. $2x + 4$.

2. $\frac{a+b}{2c}$.

6. $a^2 - b^2$.

10. $y + n$.

3. $3y^2 - x$.

7. $2a + 3b + 4c$.

4. $\frac{3a}{b+c}$.

8. $n - a$.

Page 40

1. 34. 2. 8. 3. 77. 4. 17. 5. 3. 6. 60.

Page 41

- | | | | |
|--------|--------|---------|---------|
| 1. 2. | 5. 2. | 9. 1. | 13. 6. |
| 2. 30. | 6. 13. | 10. 18. | 14. 4. |
| 3. 36. | 7. 3. | 11. 5. | 15. 30. |
| 4. 15. | 8. 28. | 12. 21. | 16. 21. |

Page 42

- | | | | |
|---------|-----------------------|-----------------------|-----------|
| 17. 27. | 21. 1. | 25. 12. | 29. 12.7. |
| 18. 6. | 22. $1\frac{1}{30}$. | 26. 3. | 30. 2.6. |
| 19. 6. | 23. 6.3. | 27. 9. | 31. 0. |
| 20. 6. | 24. 5. | 28. $10\frac{1}{3}$. | 32. 56. |

Page 42. Matching Exercises

- | | | | | |
|---------------|---------------|---------------|---------------|----------------|
| 1. <i>e</i> . | 3. <i>a</i> . | 5. <i>h</i> . | 7. <i>j</i> . | 9. <i>c</i> . |
| 2. <i>f</i> . | 4. <i>b</i> . | 6. <i>d</i> . | 8. <i>i</i> . | 10. <i>g</i> . |

Page 43

- | | |
|-----------------------------|--|
| 1. 5 <i>w</i> . | 7. $c = 10d + 25q$. |
| 2. $(2x + 2y)$ inches. | 8. $i = 36y + 12f$. |
| 3. $5m + 3xy$. | 9. $\frac{c}{2} = \pi r$, or $\text{arc} = \pi r$. |
| 4. 4 <i>s</i> . | 10. $d = 2r$. |
| 5. <i>nt</i> miles. 192 mi. | 11. $C = \$5n$. |
| 6. $p = Br$ | 12. $P = a + b + c$. |

Page 44

- | | | |
|--------------------|------------------------|--------------------------------|
| 13. $P = 3s$. | 15. $C = np\phi$. | 17. $H. P. = \frac{va}{746}$. |
| 14. $C = \$.07K$. | 16. $r = \frac{1}{4}I$ | |

Page 46

- | | | | | |
|-------|-------|--------|--------|--------|
| 1. 6. | 3. 7. | 5. 20. | 7. 12. | 9. 20. |
| 2. 4. | 4. 6. | 6. 8. | 8. 2. | |

Page 47

- | | | | |
|-----------|--------------|---------|---------------|
| 1. 8. | 3. 10. | 5. \$1. | 7. \$101.44. |
| 2. 29 mi. | 4. \$12,000. | 6. 60. | 8. \$6327.70. |

Page 53

- | | | | | |
|---------|----------|----------------------|---------|----------------------|
| 1. 40. | 3. 59. | 5. $10\frac{1}{2}$. | 7. 11. | 9. $12\frac{1}{3}$. |
| 2. 110. | 4. 14. | 6. 23. | 8. 25. | 10. 1000. |
| | 11. 200. | | 12. 15. | |

Page 53

1. 70.

Page 54

- | | | | |
|-------------|---------|----------|------------|
| 2. \$28.05. | 3. 70". | 4. \$95. | 5. 600 mi. |
|-------------|---------|----------|------------|

Page 54

- | | | | | |
|-------|--------|--------|--------------------|---------|
| 1. 6. | 4. 9. | 7. 12. | 10. $8\frac{1}{4}$ | 13. 28. |
| 2. 6. | 5. 16. | 8. 10. | 11. 20. | 14. 56. |
| 3. 8. | 6. 68. | 9. 3. | 12. 105. | 15. 10. |

Page 55

- | | | | | |
|--------------------------|--------|--------|--------------------|-------------|
| 1. 2. | 2. 11. | 3. 32. | 4. $12\frac{1}{2}$ | 5. \$3,300. |
| 6. t , 75¢; c , 25¢. | | | | |

Practice Test

- | | | | |
|----------------------|---------------------|----------|---------|
| 1. 8. | 6. $6\frac{1}{4}$. | 11. 600. | 16. 3. |
| 2. 12. | 7. 2. | 12. 5. | 17. 3. |
| 3. 11. | 8. 3. | 13. 4. | 18. 2. |
| 4. $7\frac{3}{8}$. | 9. 4. | 14. 3. | 19. 36. |
| 5. $7\frac{8}{16}$. | 10. 10. | 15. 8. | 20. 14. |

Selection Test

- | | | |
|---------------------|---------------------|----------|
| 1. $5\frac{1}{2}$. | 2. $6\frac{1}{4}$. | 3. 11.1. |
|---------------------|---------------------|----------|

Page 56

- | | | | |
|--------|--------|---------------------|--------|
| 4. 19. | 6. 18. | 8. 1. | 10. 2. |
| 5. 10. | 7. 4. | 9. $9\frac{1}{2}$. | |

Review

- | | |
|------------------------------|-----------------------------|
| 1. $A + B + C = 180^\circ$. | 2. $g = 7.5 \text{ } lwh$. |
|------------------------------|-----------------------------|

Page 57

- | | |
|-------------------------|---------------------------|
| 3. $3M + 5C$. | 7. $T = \frac{lwh}{35}$. |
| 4. $T = wh$. Increase. | 8. $h = 2A/b$. |
| 5. $d = rt$. | 9. $C = 25 + 2w$. |
| 6. $K = wh$. | |

10. $C = \$05\ o.$

11. $N = 6\ t + 8\ u.$

12. $6\ n + 5 = 23.$

13. $n + 5\ n = 24.$

14. $l = w + 6.$

15. $C = \frac{\$10000}{360 \cdot 160}$ or $C = \$0.174.$

Page 58

16. The time in hours.

17. The base.

18. Good high school record. Good character. Honesty. Excellent athlete. Etc.

19. Number of days worked.

21. Price.

20. Sales.

22. Increases. Decreases.

Page 62

1. $-44, +1821, +1799.$

3. $+48^\circ; +82\frac{1}{2}^\circ; -67^\circ.$

2. $+14, 108; -1292.$

4. $-120^\circ; +62^\circ; +10^\circ.$

5. $+110'; -86'; -180'.$

Page 63

6. $-10^\circ.$

7. $+250\ \text{lb.}, -250.$

8. $-30,000\ \text{tons}; +30,000\ \text{tons}.$

9. $+\$7000; +\$1200; +\$400; +\$850; -\$250; -\$125.$

Page 64

10. $\$8775.$

Page 70

1. $+9.$

6. $0.$

11. $-9.$

16. $-2.$

2. $+4.$

7. $-7.$

12. $-3.$

17. $-6.$

3. $+3.$

8. $-10.$

13. $+3.$

18. $+7.$

4. $+2.$

9. $-9.$

14. $+1.$

19. $-9.$

5. -1

10. $+9.$

15. $-2.$

20. $0.$

Page 71

1. $+2; +7; -9; +4; -6; +2; +36; -23; -8; +12; -12; -9; +1; +6; -4; -2.$

2. (a) 11 dollars. (b) $+11.$

6. $+4.$

3. (a) -1 mile. (b) $-1.$

7. $+5.$

4. (a) 2 cents. (b) $+2.$

8. $-2.$

5. (a) 2 dimes. (b) $+2.$

9. $+4.$

10. 3 bu.
11. -11 yds.
12. 8 dollars.
13. +9.
14. 20 degrees.
15. 7; 6; 9; -8; 5; -24.
16. -8; -2; +2; +4 degrees.
17. -15; +2; +2; -5.
18. +5; +1; -15.
19. +1; +14; -2; +10; -22 cents; +12 dollars.
20. +13; +12; -6; +1; +7.
21. -12; -1; +1.

22. -5 eighths; 4 sixths; 13 twelfths; -10 sixteenths.
 23. -8 ; -6.5 ; $+7.4$; $+18.9$; $+1\frac{1}{2}$.
 24. (a) 2 ; (d) -10 ; (g) -8 .
 (b) 1 ; (e) $+2$. (h) -8 .
 (c) 1 . (f) -3 . (i) $+4$.

25. -7 .	29. -73 .	33. -7 .	37. $+100$.
26. 36 .	30. $+5$.	34. -7 .	38. $+17$.
27. -6 .	31. $+3$.	35. -22 .	
28. $+19$.	32. -10 .	36. $+800$.	

1. $+5 + 10 = +15$.
2. $-6 + (-17) = -23$.
3. $-8 + (-12) = -20$.
4. $+5 + 20 = +25$.
5. $+15 + (-5) = +10$.
6. $+4 + 8 = +12$.
7. $+9 + 8 + (-3) = +14$.
8. $+3 + (-1) = +2$.
9. $+18000 + (-4000) = +14000$.
10. $+20 + (-5) = +15$.
11. $+30 + (-10) = +20$.
12. $-15 + 20 = +5$.
13. $+20 + (-15) = +5$.
14. $+7 + (-5) = +2$.
15. $-9 + 15 = +6$.
16. $+6 + 5 = +11$.
17. $+7 + (-9) = -2$.
18. $+60 + (-60) = 0$.

19. $+10 + 5 = +15$. 20. $+25 + (-10) = +15$.
21. $+30 + (-5) = +25$.

(a) 2. (b) 8. (c) 10. (d) 16. (e) -7 .

1. $+13; +5; -3; -6; -7; 4; -4; -10; -4.$
2. $13; 5; -3; -6; -7; 4; -4; -10; -4.$

3. 9; 8; -14; -4; 9; 8; 4; -12; -9; -8; -9; 14; 13; -11;
-4; -18; +3; +9; 3; -24; 20; 11; -7; -7; -11; +18.

Page 78

1. -13, 2, 21, 9, 0, -8, 8, 19, 4, -14, 7, 8, 9, -9, -17, -6, 5, -3.
2. -1, -14, 2, 11, -7, -24, 38, 5.
3. \$2, -\$13, 17, 0, 6, 3, 16, 4, -9, 15, 27.
4. 4, -2, 3, -31, 10, 7, 9, -11, 16, 12.

Page 79

5. -1, 23, 6, -16, 24, -30, 50, 25, 38, 8.
6. -7, 2, 9, 18, 3.
7. 4, -4, -8, -18, -9.
8. 2, 7, -4, -5, -15.
9. 12, 1, 32, 8, 14, 5.
10. 7 y.
11. -40 x.
12. 1152, 396, 146, -194, 135, -573.
13. -9.90, 3.68, 1.2 ft., 2.2 lbs., 21.8%.
14. $-\frac{1}{2}$, $8\frac{1}{8}$, $4\frac{1}{4}$, $-20\frac{1}{4}$.
15. -1.
16. 12, 5, -2, 2, 15, -13.
17. 5° upward.
18. 55 years.

Page 80

19. 101° .
20. 74 years.

Page 81

1. +12, -6, -40, -18, -20.
2. +32, -18, -35, 24, -42.
3. +15, -15, +10, -10, +25.
4. +50, -32, -3, 2, 5.
5. -30, -72, 30, 12.
6. -36, -48, 200, -144.
7. -150, -5, -48, 60.

Page 82

1. +2, -2, +2, -2.
2. -4, -2, -3, -4.
3. -4, +2, -5, +2.

Page 83

4. -1.25, +2.5, -5.
5. -5, -4, +5, +9, -9, +7.
6. 0, 0, +6, +2, -4, -7.
7. +2, -2, -2, +2, -2, +2, -2, +4, -4.
8. -6, +2, -5, +4, -4, -5.
9. -2, +4, +15.
10. +10, +15, -40, -147.

Review

1. +180, -10, -20, +32. 3. 0, +17, -16, -38, +51.
 2. +40.4 feet. 4. +34, +8, 0, +5, -18.

Page 84

5. 360. 9. 0. No. See note p. 82. 13. 2.
 6. 18° . 10. -468. 14. 83.
 7. 60,626 feet 11. $-7\frac{7}{8}$. 15. $(w+x)$ feet; 32 feet.
 8. 2916 years 12. $-3\frac{1}{15}$. 16. +2, 0, -3 feet.

Page 85

17. +83, -43, +13, -2, +256, -98, +65, -65.
 18. +72, +72, -72, -72, +30, -35, -42, -132.
 19. $7''$, $14''$, $28''$. 20. 52.3 sq. in.
 21. Left, -1; left, -2; left, -3; left, -5; right, +7; right, +8;
 right, +9; right, +11.
 22. (a) 4. (b) 9. (c) 24. (d) 6.
 23. 81. 24. +4, -27, +32, -48.
 25. +16, -64, -1. 27. -1024. 29. 72,000. 31. 24.
 26. -32, -72. 28. -432. 30. -32. 32. -16.

Page 86

1. No. 4. 2. 8. $F = \frac{mv}{t}$.
 2. Yes. 5. $V = \frac{d}{t}$. 9. $C = 7 M$ dollars.
 3. $12''$. 7. $T = nr$. 10. $C = 1.15 M$ dollars.
 12. (a) 15. (c) 12. (e) 64.
 (b) 90. (d) 12. (f) 20.
 13. Product, sum.

Page 87

14. (a) 21. (c) 108. (e) 15.
 (b) 44. (d) 10. (f) 32.
 15. (a) $k + 10$, $k + 20$, $k + 30$.
 (b) $d = k + (n - 1) 10$.
 (c) $60 = 60$.
 16. $D = dQ + R$. 17. $x = 6$. 18. -21.

Page 90

1. 13 inches. 4. +5 c . 7. -5 x . 10. -2 z .
 2. 18 nickels. 5. -5 x . 8. -7 x .
 3. -3 n . 6. -16 x . 9. +5 a .

Page 91

- | | | | |
|---------------|----------------|----------------|-------------------|
| 11. $+3x$. | 18. $-5xy$. | 25. 0. | 32. $-4b$. |
| 12. $-28b$. | 19. $+3ab^2$. | 26. $-6x$. | 33. $-9x$. |
| 13. $+20x$. | 20. $-10xyz$. | 27. $+4x$. | 34. $2x^2$. |
| 14. $-40x$. | 21. $-5abc$. | 28. $-5x$. | 35. $-2x^2$. |
| 15. $-10x$. | 22. $+22x$. | 29. $-20x$. | 36. 0. |
| 16. $+2x$. | 23. $-26bcd$. | 30. $+15x^2$. | 37. $-a^2b$. |
| 17. $-5x^2$. | 24. $+24ax$. | 31. $7n$. | 38. $-11x^2y^2$. |
| | 39. 0. | | |

Page 92

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|--------------------------|--------------------|-------------------|-----------------------------|
| 40. $-\frac{3}{4}ab$. | 43. $-1.3x^2y^2$. | 46. $+5x^n$. | 49. $-6.5ex$. |
| 41. $+\frac{11}{2}xy$. | 44. $+1.8x^2$. | 47. $-11x^ny^m$. | 50. $-\frac{3}{8}xa^{+1}$. |
| 42. $+\frac{1}{10}x^2$. | 45. $+16abx$. | 48. $+6HKY$. | |

Page 92

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|-----------------|-----------------|---------------------|
| 1. $4x + 5y$. | 4. $7c + 5d$. | 7. $by - dz$. |
| 2. $7x - 4y$. | 5. $12d - 3q$. | 8. $hk + mn$. |
| 3. $9x - 13y$. | 6. $ax + cy$. | 9. $ax + by - ez$. |

Page 94

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|-------------------|------------------------|
| 1. $8x - 2$; 22. | 3. $3x + 4y + 7$; 24. |
| 2. $6x + 3$; 15. | 4. $7a + 4c$; 37. |

Page 95

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|---------------------------------------|---------------------------------|
| 5. $28x + 26y + 37z$; 282. | 14. $14x + 8y$; 52. |
| 6. $9x + 4y - 2z - 4$; 18. | 15. $3x$; 6. |
| 7. $15x^2 + 14y^2 + 11$; 202. | 16. $3x + 2y + 8z$; 44. |
| 8. $10x^2 + x + 1$; 43. | 17. $6x^2 - 2x - 8$; 12. |
| 9. $18x^2 + 7x$; 86. | 18. $x^2 - 3x + 5$; 3. |
| 10. $15x^3 + 11x^2 + 11x + 16$; 553. | 19. $5x^2 - 3xy - 6y^2$; 3. |
| 11. $3x^2 + 5x$; 22. | 20. $3x^2 - 5xy - 3y^2$; - 15. |
| 12. $3x^4 + 13x^3 + 10x^2$; 192. | 21. $16(x + y) + 2z$; 50. |
| 13. $-4x^2 + 15.4$; -384.6 | 22. $3n + 12x - 22$. |

Page 96

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|------------------------------|--------------------------------------|
| 23. $15a - 6b + 2c$. | 29. $3x^4 - 7x^3 + 5x^2 + 16x + 5$. |
| 24. $15x + 3y - 15z$. | 30. $y^3 - 2y^2 - 16y + 28$. |
| 25. $4h + 19k + 5m$. | 31. $3x^3 + 5x^2 - 4x - 1$. |
| 26. $2x - 14y - 25k + 14l$. | 32. $9x - 4$. |
| 27. $8h^2 + 14hk - 12k^2$. | 33. $14x^2 - 6xy - 6y^2$. |
| 28. $7ab + 6ac + 2bc$. | 34. $6a^3$. |

35. $a - 10b - 5c.$

36. $2x - 5y - 3.$

37. $7x - 20y - 8z.$

38. $-10b.$

39. $13x + 17y - 17z.$

40. $-7x - 2y + 14.$

41. $-2xy + 7y^2.$

42. $2a^2 + 4ab - 2b^2.$

43. $-9z^2.$

Page 97

44. $15.8x + 15.2y.$

45. $14.5x + 2.5y.$

46. $6.6a - 3.8b.$

47. 1.

48. $1\frac{5}{8}x - \frac{5}{8}y.$

49. $3\frac{1}{2}N + \frac{1}{2}M.$

50. $6H - 1\frac{3}{10}K.$

Time-Test

1. $3xy.$

2. $8bc.$

3. $-8cd^2.$

4. $2c^2d.$

5. 0.

6. $64y^2.$

7. $11a - 11b.$

8. $7x - 7y.$

9. $-10a^2 - 14b^2.$

10. $-11y^2 - 7yz.$

11. $8a^2 - 12y^2.$

12. $4a + 3b.$

13. $-12x^2 - 17.$

14. $-2a^2 + 7ab - 9b^2.$

15. $22ab - 35.$

16. $-3x^3 + x^2.$

Page 98

1. $22x.$

2. $-15x.$

3. $6x.$

4. $-16x.$

5. $14x.$

6. $20x.$

7. $-10x.$

8. $-6x.$

9. $-15y.$

10. $10x.$

11. $15y^2.$

12. $-15xy.$

13. $16xy.$

14. $-7xy.$

15. $22xy.$

16. $-9x.$

17. $60xy.$

18. $-100a.$

19. $-50xyz.$

20. 0.

21. $-5a^2b^2.$

22. $4x.$

23. $4.9x.$

24. $1.5x.$

25. $-5x^2.$

26. $50x^3.$

Page 99

27. 0.

28. $60x^4.$

29. $-5a^2x.$

30. $45x^2.$

31. $150x^2.$

32. $-50x^2.$

33. $-150x^2.$

34. $90x^2y.$

35. $-14x^2yz.$

36. $-3x^3y.$

37. $2(x + y).$

38. $8\sqrt{x}.$

39. 6.1.

40. $b - a.$

41. $4y - 7x.$

42. $7z - 9x.$

43. $6x - 5y.$

44. $5b - 6a.$

45. $5y^2 - 3x^2.$

46. $3z^2 - 4y^2.$

47. $4y^2 - 3z^2.$

48. $0 - 7x.$

49. $12ab - 9x^2y.$

50. $-12x.$

51. $7x.$

52. $-4x.$

53. (a) $x.$

(b) $-x.$

(c) $4x - 3x.$

54. 12.

55. (a) 12.

(b) $-12.$

56. Richer.

Page 100

57. $-\$5.25; -\$5.25.$

True-False

- | | | | |
|--------------|---------------|---------------|---------------|
| 1. <i>f.</i> | 6. <i>t.</i> | 11. <i>t.</i> | 16. <i>f.</i> |
| 2. <i>t.</i> | 7. <i>t.</i> | 12. <i>t.</i> | 17. <i>t.</i> |
| 3. <i>t.</i> | 8. <i>t.</i> | 13. <i>t.</i> | 18. <i>t.</i> |
| 4. <i>f.</i> | 9. <i>f.</i> | 14. <i>t.</i> | 19. <i>t.</i> |
| 5. <i>f.</i> | 10. <i>t.</i> | 15. <i>f.</i> | 20. <i>f.</i> |

Page 102

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|-------------------------|----------------------|---------------------------|
| 1. $2x - 14y + 13z$. | 10. $x - 11$. | 19. $5x^3 + 12x^2 + 2$. |
| 2. $7x + 7y + 2z$. | 11. $-6a + 12$. | 20. $3x^2 - 2xy - 2y^2$. |
| 3. $x + 9y - 12z$. | 12. $-2a + 2$. | 21. $-17x^2 + 11x + 5$. |
| 4. $2x^2 - 3x - 8$. | 13. $x + 6$. | 22. $15x + 7 + x^2$. |
| 5. $7x^2 + 14x - 5$. | 14. $-3x - 5$. | 23. $-y - 15x + 7z$. |
| 6. $x^2 - 6xy - 5y^2$. | 15. $2x - 4y - 4z$. | 24. $9x - 17x^2 - 10$. |
| 7. 1. | 16. $-2h + k$. | 25. $6x^2 - 10x + 8x^3$. |
| 8. -1 . | 17. $9x + y - 2z$. | 26. $-2x + 7x^2 - 13$. |
| 9. $2x + 9$. | 18. $4x^2 + x - 1$. | |

Page 103

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|---------------------------|------------------------------|
| 27. $3x^2 - 3x - 2$. | 39. $-4x - 5y + 3a + 5k$. |
| 28. $2x^2 + 10y^2$. | 40. $2x + y$. |
| 29. $-5x^2 + 2y^2$. | 41. $10x - 8y$. |
| 30. $-2x - 10y$. | 42. $4b$. |
| 31. $-x - 7y - 2z - 23$. | 43. $-2x^2$. |
| 32. $-x - 3y + 6z$. | 44. $7x + 5y + 4z$. |
| 33. $4x - y + 3z$. | 45. $3z$. |
| 34. $-x + 8z$. | 46. $x^4 - 3x^3 - 13x + 4$. |
| 35. $2y$. | 47. $-25x^2 + 8x + 10$. |
| 36. $a + 2b + 3c$. | 48. $-x^4 - 6x^2 - 28$. |
| 37. $a - 5b$. | 49. $x^3 - 8x^2 - x + 3$. |
| 38. $-3a - 4b + 5c$. | 50. $-x^3 - 7x^2 + 6x + 1$. |

Page 104

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|-------------------------------------|---------------------------------|
| 51. $8x^2 + 11x + 12$. | 59. $y - x$. |
| 52. $8y$. | 60. $9x^3 + x^2 - 8x + 13$. |
| 53. $16x^3 - x^2 + 12x - 22$. | 61. $-4n^3 + 3n^2 + 8n - 10$. |
| 54. $3x^4 - 6x^3 - 3x^2 - 8x + 6$. | 62. $-3R^2 + 8RD + D^2$. |
| 55. $9x^3 + x^2 - 11x - 7$. | 63. $3.5r + 2t$. |
| 56. $4x^4 - 8x^2 + x$. | 64. $-x^2 + \frac{1}{6}x - 1$. |
| 57. $-5y^2z + 17yz^2 - 10z^3$. | 65. $v'' + 14v' - 13$. |
| 58. $m^3 - 3m^2 - 9m + 8$. | |

Page 105

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|------------------|---------------------|--------------------------|
| 1. $-3xy$. | 8. $73a$. | 15. xy . |
| 2. $-11abc$. | 9. $2xy^3$. | 16. $12x^2y + 9x$. |
| 3. $5y^2$. | 10. $-x$. | 17. $30a^3b + 6b$. |
| 4. $20ab^2$. | 11. $21x^2 + 5xy$. | 18. $-x^3 + 5x^2 - 12$. |
| 5. $-18x^2y^2$. | 12. $12a^2 - 2a$. | 19. $11x^3 - 36x + 17$. |
| 6. $51a^3b$. | 13. $-44by + 2$. | 20. $15x^3 - 20x + 2$. |
| 7. $-14x^2y$. | 14. $2xy$. | |

Page 107

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|-------------------|-----------------|-----------------------|
| 1. $3 + 2x$. | 8. $1 - 2y$. | 15. $.8 - 3x$. |
| 2. $7a + b$. | 9. $2y - 2$. | 16. $6 - y$. |
| 3. $8x + 5$. | 10. $2y + 2$. | 17. $3.2 + 5x$. |
| 4. $7a - 3c$. | 11. $5x - y$. | 18. $y + 11.5$. |
| 5. $4b - 2c$. | 12. $-x + 3y$. | 19. $2x^2 - 6x + 4$. |
| 6. $-x - y + 2$. | 13. 23.3 . | |
| 7. $4y - 1$. | 14. 7.5 . | |

Page 108

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|--------------------------|-----------|--------------------|
| 20. $2x^2 - xy - 3y^2$. | 21. x . | 22. $2b^2 - a^2$. |
|--------------------------|-----------|--------------------|

Page 108

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|---------------|---------------|------------------------|
| 1. 1. | 5. $3D - 2$. | 9. $15x - 17$. |
| 2. 29. | 6. $8y + 2$. | 10. $2 - 6x$. |
| 3. $-3b$. | 7. $y - 3x$. | 11. $-3y^2 + 4y$. |
| 4. $1 - 4x$. | 8. $3 - 4n$. | 12. $-7m^2 + 4m - 2$. |
| | | 13. 3. |

Page 109

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|---------------------------|------------------------|--------|
| 14. $-2x^2 - x + 1$. | 16. $2\frac{1}{2}at$. | 18. 8. |
| 15. $-3x^3 - 7x^2 + 4x$. | 17. 6. | |

Page 109

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|--------------------------------|------------------------------|
| 1. $5x - (y - 6z + w)$. | 5. $4y^2 - (x^2 - 2x + 1)$. |
| 2. $2a - (b + c - d)$. | 6. $x^2 - (y^2 + 2y + 1)$. |
| 3. $8x - (5a - 6b + 2c)$. | 7. $a^2 + (-b^2 - c^2)$. |
| 4. $x^2 - (y^2 + z^2 - 2yz)$. | |

Page 110

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| 8. $+(x^2 - 6x + 9) - (y^2 - 4y + 4)$. |
| 9. $+(6m^2 - 8mn + 10) - (-6n^2 + 8n + 3)$. |

10. $+(x^2 - 3x - 2xz) - (-4y - 6y^2 - 5yz)$.
 11. $+(3x - ax - 6bx) - (ay - by^2 + y)$.
 12. $(9x - 4y) - (2x + 3y)$.
 13. $(4x - 5y + 2z) - (3x - 4y - 5z)$.
 14. $z^2 - (x^2 - 2xy + y^2)$.
 15. $(a - b) - (a + b)$.

Review

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|-----------------------|---------------------|-------------------------|
| 1. 66. | 4. $\frac{1}{20}$. | 7. $\frac{1}{2}ab$; 2. |
| 2. 32. | 5. -7 . | 8. 24.32. |
| 3. $-3\frac{3}{10}$. | 6. -6 . | 9. 78.54. |

Page 111

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|--------------------------------|-----------------------------------|
| 10. -42, 143, -121, -300, 1400 | 15. 5; $y + 1$; $y + 2$; y . |
| 11. 256. | 16. (a) $7m^2$. |
| 12. $-x^3 + 3x^2 + 6x - 44$. | (b) $x + y + z + w$. |
| 13. $-2x^3 - 2x^2 - 8x - 2$. | 17. $7x^4y^3z^5$. |
| $4x^3 - 2x - 2$. | 18. 140 mi.; 35 h mi. |
| $4x^3 - 4x^2 + 8x + 4$. | 19. $15 + x$; $15 - x$; $15x$. |
| 14. $x^3 - x^2 - 2x - 1$. | 20. $6x^2 - 5y^3$. |

Page 112

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|-------------|----------|--------|---------|
| 22. 200. | | | |
| 23. (a) 10. | (c) 60. | (e) 4. | (g) 7. |
| (b) 35. | (d) 200. | (f) 3. | (h) 12. |
| 24. (a) 3. | (c) 4. | (e) 8. | |
| (b) 6. | (d) 3. | (f) 5. | |

Page 114

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|---------------|----------------|------------------|------------------|
| 1. x^8 . | 7. x^6 . | 13. $30x^7$. | 19. $5a^2x^2$. |
| 2. x^4 . | 8. $4x^5$. | 14. $12x^7$. | 20. $12a^2b$. |
| 3. x^6 . | 9. $-8x^5$. | 15. $36x^4$. | 21. $24a^2b^4$. |
| 4. x^7 . | 10. $-15x^8$. | 16. $9x^2$. | 22. $12a^5x$. |
| 5. x^{10} . | 11. $42x^2$. | 17. $-27x^3$. | 23. $16x^2y^4$. |
| 6. x^9 . | 12. $-12x^6$. | 18. $60x^2y^2$. | |

Page 115

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|-----------------|-------------------|---------------|---------------|
| 24. $-x^2y^4$. | 28. $-4x^2y^2$. | 32. $4x^4$. | 36. $-6x$. |
| 25. x^5y^5 . | 29. x^{16} . | 33. $16x^6$. | 37. $5y$. |
| 26. $3x^4y^4$. | 30. 2^6 . | 34. $25x^8$. | 38. $-4xy$. |
| 27. $10x^4$. | 31. $-24x^4y^4$. | 35. $36x^2$. | 39. $7x^2y$. |

40. $4x$.
 41. $-28x^3y^3, 6a^7b^4, -20m^5n^4, 12x^5y^9$.
 42. $40a^4b^8, -60a^2b, -24a^3bc$.
 43. $1.2x^5, \frac{1}{8}x^5, .008x^2, \frac{7}{8}x^6, .25x^7$.
 44. $2^7, 2^{n+3}, 2^{n+2}, x^{n+4}, x^{n-2}$.
 45. $6(a+b)^6, (a-b)^8, 5(x+y)^5, 12(x-y)^4$.

Page 116

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|-------------------|-----------------------------|
| 1. $4x + 12y$. | 6. $x^4 + 2x^3 + 3x$. |
| 2. $3x^2 + 6x$. | 7. $3x^6 - 6x^5$. |
| 3. $5x^2 - 5xy$. | 8. $-10x^7 + 15x^6$. |
| 4. $2xy + 2xz$. | 9. $15x^4 + 6x^5 - 9x^7$. |
| 5. $-3xy + 6xz$. | 10. $-6x^5 + 8x^4 + 4x^2$. |
11. $-18a^4b - 15a^3b^2 + 12a^2b^3 - 18ab^4$.
 12. $10x^4y^5 - 40x^3y^4 - 100x^2y^3 - 50xy^2$.

Page 117

13. $-9x^6 - 18x^5 + 21x^4 - 24x^3 + 6x^2$.
 14. $-24y^4 + 66y^3 - 48y^2 + 6y$.
 15. $6AB^2C - 24A^2C^2$.
 16. $4A^4B^2 + 8A^3B^3 + 4A^2B^4$.
 17. $3x^2 + 2x - 1$.
 18. $-\frac{1}{8}R^3 + \frac{1}{12}R^2D - \frac{1}{24}RD^2$.
 19. $\frac{1}{4}x^3y + \frac{1}{6}x^2y^2 + \frac{1}{4}xy^3$.
 20. $1.3a^5 + .012a^4 - .56a^3 + 2.4a^2$.
 21. $4x + 4y$.
 22. $8R - 4D$.
23. $13x^2 + 6xy + 9y^2$.
 24. $2H + 2K$.
25. $\frac{5}{2}R^3$.

Time-Test

- | | |
|-----------------|---------------------|
| 1. $15x + 10$. | 8. $x - 5$. |
| 2. $12x - 15$. | 9. $-9x + 6x^2$. |
| 3. $6x - 18y$. | 10. $7x^2 + 140x$. |
| 4. $-7x - 21$. | 11. $-5x + 20$. |
| 5. $-4x - 36$. | 12. $12x^2 + 8x$. |
| 6. $-x - 3$. | 13. $-6x^2 - 42x$. |
| 7. $-x + 3$. | 14. $7a - 14b$. |

Page 118

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|-------------------|---------------------|
| 15. $3x - 9y$. | 17. $-45 + 15x$ |
| 16. $5ax - 20x$. | 18. $-9x^2 + 45x$. |

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|---------------------------|-----------------------------|
| 19. $16x - 4x^2$. | 23. $7x^2y - 7y$. |
| 20. $-x - y + z$. | 24. $-8x^3y + 16x^2 + 48$. |
| 21. $-6x + 9y - 12z$. | 25. $2x^2 + 3x + 4$. |
| 22. $-15x^2 + 20x - 30$. | |

Page 119

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|-------------------------|-------------------------------|
| 1. $x^2 + 3x + 2$. | 18. $14x^2 - 43x + 20$. |
| 2. $x^2 - 3x + 2$. | 19. $12a^2 + 4a - 40$. |
| 3. $x^2 + x - 2$. | 20. $6x^2 - 2x - 20$. |
| 4. $x^2 - x - 2$. | 21. $2x^2 - 5xy + 2y^2$. |
| 5. $x^2 + 6x + 8$. | 22. $6a^2 - 5ab - 6b^2$. |
| 6. $x^2 + 7x + 10$. | 23. $10h^2 + 11hk - 6k^2$. |
| 7. $x^2 + 5x + 6$. | 24. $15x^2 + 2xy - 24y^2$. |
| 8. $x^2 + 8x + 12$. | 25. $21x^2 + 40xy - 21y^2$. |
| 9. $x^2 - x - 6$. | 26. $h^2 - 2hk - 35k^2$. |
| 10. $x^2 + 2x - 8$. | 27. $15x^2 - 13xy - 6y^2$. |
| 11. $x^2 + 7x + 12$. | 28. $8h^2 + 2hk - 15k^2$. |
| 12. $x^2 - 7x + 12$. | 29. $64 - 8y - 20y^2$. |
| 13. $x^2 + x - 12$. | 30. $6h^2 + 13hk - 5k^2$. |
| 14. $x^2 + 14x + 48$. | 31. $20x^2 - 41xy + 20y^2$. |
| 15. $x^2 + 4x - 32$. | 32. $x^4 - 12x^2 + 27$. |
| 16. $2x^2 + 14x + 20$. | 33. $2x^4 + 7x^2y^2 + 6y^4$. |
| 17. $16x^2 - 4x - 6$. | 34. $x^4 + 3x^2y^2 - 28y^4$. |

Page 120

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|---|---|
| 35. $6x^4 + 11x^2y^2 - 10y^4$. | 41. $x^3 + 3x^2 + 3x + 1$. |
| 36. $14x^4 + 19x^2y^2 - 3y^4$. | 42. $x^3 + 8x^2 + 21x + 18$. |
| 37. $21 + 26m^2 - 15m^4$. | 43. $4x^3 + 12x^2 + 17x + 12$. |
| 38. $15m^4 + 7m^2n - 2n^2$. | 44. $4x^3 + 9x^2 + 7x + 10$. |
| 39. $18x^2y^2 - 3xy - 10$. | 45. $3x^5 + 6x^4 - x^3 + 8x^2 - 4x + 2$. |
| 40. $x^3 + 4x^2 + 7x + 6$. | 46. $12m^3 + 34m^2n + 18mn^2 - 8n^3$. |
| 47. $-14x^5 + 44x^4 - 47x^3 + 26x^2 - 8x + 1$. | |
| 48. $6x^7 + x^5 - 12x^3 - 3x^2 + 4$. | |
| 49. $x^3 - y^3$. | 50. $9x^4 - 24x^3 + 28x^2 - 16x + 4$. |
| 51. $4a^4 + 2a^3 + 7a^2 + 37a - 35$. | |
| 52. $2a^5 - 2a^4 - 21a^3 + 31a^2 - 7a + 5$. | |
| 53. $4a^4 - 4a^3 + 17a^2 - 8a + 16$. | |
| 54. $-5x^3 + 18x^2 - 6x + 1$. | |
| 55. $x^4 + 3x^3 + 2x^2 - 3x - 9$. | |
| 56. $\frac{1}{4}x^3 - x^2 + \frac{4}{3}x - \frac{2}{3}$. | |
| 57. $6C^3 + 5C^2 - 12C + 4$. | 59. $.1x^2 - .95xy + 1.2y^2$. |
| 58. $\frac{1}{4}x^2 - \frac{1}{9}$. | 60. $(x + 2)^3$. |

Page 121

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|--------|---------|---------|----------|
| 1. 1. | 5. -30. | 9. -4. | 13. -1. |
| 2. 4. | 6. -20. | 10. 10. | 14. -16. |
| 3. 10. | 7. 34. | 11. 8. | 15. -19. |
| 4. -1. | 8. 7. | 12. 2. | |

Page 121

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|----------------|-------------------------|
| 1. $4x, x^2$. | 2. $4x + 6, x^2 + 3x$. |
|----------------|-------------------------|

Page 122

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|-------------------------------------|--|
| 3. $x^2 + 3x = 30 + x^2$. | 10. $\frac{x}{4}$ mi. |
| 4. $10 - 6$. | 11. $\frac{x+1}{a}$. |
| 5. $10 - n$. | 12. $2x; x + 10; 2x + 10$. |
| 6. $10x^2$. | 13. $x - 10; x + 15; 12x; \frac{x}{3}$. |
| 7. $x + 10; x - 10$. | 14. $2x + 15$. |
| 8. 45 mi.; $3n$ mi.; $3(x + 1)$ mi. | 15. $60 - x; x - 60$. |
| 9. 50 mi. | |

Page 123

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|---|--------------------------------|------------------------|
| 16. $y - 15$. | 17. $\frac{pdy}{100}$ dollars. | 18. $3d + 5; 4d + 5$. |
| 19. 900 mi.; 45 m mi.; 45 $(m + 1)$ mi. | | |
| 20. hm . mi. | 21. 36; 24. | 22. $s^2; 4s$. |

Page 124

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|------------------|--------------------------|------------------|
| 23. $100d + c$. | 26. $-2xy - xy = -3xy$. | 29. $10 - y$. |
| 24. $2.5d$. | 27. $6x^6y = 192$. | 30. $4300 - b$. |
| 25. $h - k$. | 28. $x^4y^5 + z^6$. | |

Page 124

1. 11 and 9.

Page 125

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|-----------------------|---------------------|
| 2. 30, 24. | 6. $d, 40; n, 20$. |
| 3. 36, 4. | 7. $q, 16; d, 30$. |
| 4. 30, 15. | 8. $d, 46; n, 26$. |
| 5. $c, 30¢; t, 60¢$. | |

Page 126

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|-----------------------|------------------------|
| 9. h , 5; q , 15. | 12. $20'$; $12'$. |
| 10. 30. | 13. $78'$ by $36'$. |
| 11. 24 by 6. | 14. $8''$ and $38''$. |

Page 127

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|---|---------------------------|
| 15. $28''$ and $24''$. | 19. E , 6, M , 24. |
| 16. $7\frac{1}{2}$, 15, $15\frac{1}{2}'$. | 20. Ja , 24; Jo , 48. |
| 17. 66 and $24''$. | 21. J , 22; S , 18. |
| 18. 45 and $5''$. | 22. Y , 6; O , 12. |

Page 128

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|-----------------|--------------------|---------------|
| 1. $-x^8$. | 5. $-15x^6$. | 9. 120. |
| 2. $-5x - 15$. | 6. $9x - 12$. | 10. $-5x^9$. |
| 3. $-6x + 42$. | 7. 36. | 11. 11. |
| 4. $-12x + 6$. | 8. $-4x^4 + x^6$. | 12. -75 . |

Review

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|------------------|----------|----------|
| 1. 5 hr. 36 min. | 3. t . | 5. f . |
| 2. f . | 4. f . | 6. t . |

Page 129

- | | | |
|--------------------------------|-----------------------|---|
| 7. pounds; price. | 10. tons; price. | 13. (a) 2. (b) 3. |
| 8. price; each. | 11. rate. | (c) 5. (d) 8. |
| 9. n . | 12. $21y^2 - yz$. | 14. No. $0^2 = 0$, $(\frac{1}{2})^2 = \frac{1}{4}$. |
| 15. $6x + 9y$. | 18. $20(x^2 - y^2)$. | |
| 16. $3x^4 - 5x^2 + 6x - 17$. | 19. $-x + 17y$; 33. | |
| 17. $-x^3 + 14x^2 - 5x - 20$. | 20. $x + y^2 - 10z$. | |

Page 130

- | | |
|----------------------------------|-----------------------------|
| 21. $14m^2 + 6m$. | 27. 18. |
| 22. $-3x^3 + 12x^2 + 27x - 38$. | 28. (a) 11. (b) 22. (c) 12. |
| 23. $2x^3 + 3x^2 - x - 12$. | 29. 65% ; $5t + 6h$. |
| 24. $3x^2 - 4x + 10$. | 30. $p = Mm$. |
| 25. 4 HK . | 31. (a) 6. (c) 15. (e) 2; |
| 26. $4x^2 - 7x$. | (b) 5. (d) 6. (f) 13. |
| 32. 13 yr. 3 mo. | |

Page 132

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|------------|--------------|------------|---------------|
| 1. x^4 . | 2. $-5x^3$. | 3. $4ab$. | 4. $-2ab^2$. |
|------------|--------------|------------|---------------|

Page 133

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|-----------------|-----------------------|-----------------------|
| 5. $5x^2$. | 17. $8axm^2$. | 28. $3H$. |
| 6. $-9a^2b$. | 18. $-11x^3$. | 29. .05. |
| 7. yz . | 19. $5x^3$. | 30. 3. |
| 8. $-2xyz$. | 20. $5x^4$. | 31. $2K^2$. |
| 9. $4a^2c$. | 21. $\frac{10y}{z}$. | 32. 3. |
| 10. $3bk$. | 22. $\frac{4b}{a}$. | 34. e^{x-y} . |
| 11. $-2xy^3$. | 23. $-32x$. | 35. a^{m-n} . |
| 12. $2m$. | 24. $-32y$. | 36. $4x^{2a}$. |
| 13. $-3bc$. | 25. $\frac{1}{2}$. | 37. $4x^{2a}$. |
| 14. $-6mn$. | 26. $-\frac{1}{2}$. | 38. $3e^a$. |
| 15. $-10a^2y$. | 27. $\frac{13}{2}y$. | 39. $-4x^{m+3}$. |
| 16. $-10ax$. | | 40. $3x^{2m}y^{2n}$. |

Page 134

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|-----------------------------|-------------------------------------|
| 1. $x^3 - x^2$. | 12. $3y^2 + 5y + 2$. |
| 2. $y + z$. | 13. $2x^3 + 3x^2 - 4x^4$. |
| 3. $4 + 5ab$. | 14. $-3m - 4n + 6n^2$. |
| 4. $2x - y - 4$. | 15. $-HK + 9$. |
| 5. $B - 3$. | 16. $5x^2y - 8y^2 - 3x^2y^2$. |
| 6. $3x^2y + 8y^2 + 12xy$. | 17. $8a^2x^2 - 7ay + 4a^3x$. |
| 7. $a + b - c$. | 18. $6a^2b^2 - 10a^3b - 2a^2 + 5$. |
| 8. $-6 + 3x + 4x^2$. | 19. Yes. |
| 9. $m^2n^4 - 3m^3n^2 + 4$. | 20. 0, 0, 0, 0, 0, 0. |
| 10. $-2x - 8y^2 + 6$. | 21. $y + y^2$. |
| 11. $-3a^2 - 9b + ab^2$. | 22. $6 + h + k$. |

Page 135

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|--|-------------------------------------|
| 23. $x + \frac{1}{2}$. | 27. $2x^3 + 3x^2 - 4x^4$. |
| 24. $\frac{2}{3} + x + \frac{1}{2}x^3$. | 28. $2x^{3n} + 3x^{2n} - 4x^{4n}$. |
| 25. $1 + 6x + 4x^5$. | 29. $x^2 + 2x + 4x^{-1} - 6$. |
| 26. $1 + 2x - 3x^2$. | 30. $-.3a - .4b + .5a^2b^2$. |
| | 31. 7th.; 4th.; 5th. |

True-False

- | | | | | |
|---------------|---------------|---------------|----------------|----------------|
| 1. <i>t</i> . | 4. <i>f</i> . | 7. <i>t</i> . | 10. <i>f</i> . | 13. <i>t</i> . |
| 2. <i>f</i> . | 5. <i>t</i> . | 8. <i>t</i> . | 11. <i>t</i> . | 14. <i>f</i> . |
| 3. <i>f</i> . | 6. <i>f</i> . | 9. <i>f</i> . | 12. <i>f</i> . | 15. <i>t</i> . |

Page 138

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|----------------|----------------|-----------------|
| 1. $x + 7$. | 13. $2x + 3$. | 25. $x + 5$. |
| 2. $x - 3$. | 14. $-n + 1$. | 26. $x - 5$. |
| 3. $x - 4$. | 15. $-x - 6$. | 27. $2a - 4$. |
| 4. $x + 4$. | 16. $-x + 6$. | 28. $4x + 1$. |
| 5. $x - 5$. | 17. $n - 6$. | 29. $4a - 6$. |
| 6. $R + 5$. | 18. $x - 3$. | 30. $6a - 1$. |
| 7. $x + 4$. | 19. $n + 2$. | 31. $6a + 2$. |
| 8. $x + 16$. | 20. $x + 5$. | 32. $2a - 3$. |
| 9. $x - 22$. | 21. $2y - 3$. | 33. $7a - 2$. |
| 10. $x - 11$. | 22. $2y + 5$. | 34. $3y + 4$. |
| 11. $2a - 3$. | 23. $a - 3$. | 35. $2 - 4y$. |
| 12. $4a + 3$. | 24. $a + 3$. | 36. $10m + 3$. |
| | | 37. $3x + 8$. |

Page 139

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|----------------------|---------------------------|-----------------------------------|
| 38. $1 - 4x$. | 48. $x^2 - 3x + 2$. | 57. $x^2 + x + 1$. |
| 39. $a + 2b$. | 49. $x^2 - 4x + 1$. | 58. $3a - 8$. |
| 40. $a - 7b$. | 50. $3x^2 - 6x + 4$. | 59. $a^x + b^x$. |
| 41. $2x - y$. | 51. $x^2 + x + 1$. | 60. $x^{2a} + x^a y^b + y^{2b}$. |
| 42. $4x - y$. | 52. $x^2 - 2x + 4$. | 61. $9x^2 + 3x + 1$. |
| 43. $m - n$. | 53. $x^2 + 3x + 9$. | 62. $4x^2 - 6xy + 9y^2$. |
| 44. $2a + 5b$. | 54. $1 - x + x^2 - x^3$. | 63. $x + 8$; Rem. 35. |
| 45. $6a + 2b$. | 55. $x^2 - 2xy + y^2$. | 64. $.3x - .4y$. |
| 46. $3a + 7b$. | 56. $3x^3 + 4x^2y$ | 65. $e^{2x} - 4e^x + 16$. |
| 47. $x^2 + 4x - 2$. | $+ 5xy^2 + 2y^3$. | |

Page 140

Matching

- | | | | |
|-------------|---------------|------------------|---------------|
| 1. x^4 . | 4. x^{10} . | 7. $-x^6$. | 10. $-7x^2$. |
| 2. x^7 . | 5. 1. | 8. $-x^3$. | |
| 3. $5x^6$. | 6. $15x^8$. | 9. $-10x^{10}$. | |

Multiple-Choice

- | | |
|--------------------------|---------------|
| 1. $a \cdot a \cdot a$. | 3. term. |
| 2. coefficient. | 4. trinomial. |

Page 141

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|--------------|---------------------|--|
| 5. monomial. | 7. $-\frac{1}{4}$. | 9. $\frac{x}{2} + \frac{y}{2} - \frac{1}{2}$. |
| 6. 2. | 8. multiplication. | |

Page 141

1. $x^6 - y^6$.
2. $-15(x^2 + y^2 + z^2)$.
3. $x^2 + 5x + 4$; x^2 ; $2x^2 + 5x + 4$.
4. 70, 36, 106.
5. $-x - 12y$; $2x^2 + 12x$; $-2xy + 13z$; $-x - 9y + 2z$.
- (a) $5x - 2y$; $12x^2$; $14xy - z$; $5x + y - 6z$.
- (b) $6x^2 - 11xy - 35y^2$; $35x^4 - 12x^3 - 36x^2$; $48x^2y^2 + 6xyz - 42z^2$; $6x^2 - 2xy - 14xz - 20y^2 + 6yz + 8z^2$.

Page 142

6. $21a^3 - 6a^2b - 10ab^2$.
7. $14x^2 + 2h - 13x$.
8. $2x - 14y + 4z$.
9. 70 by 50 ft.
10. $A = \frac{lw}{144}$.
11. 24.

Page 143

12. 6 ft. and 9 ft.
13. $C = \frac{2}{7}d$.
14. (a) $12(x + 1)$. (b) $6(x + 1)^2$.
- (c) $(x + 1)^3$. (d) Doubled. Quadrupled. Multiplied by 8.
15. By division. $x - 5$.
17. About 22 baskets.
16. $225x^2 - 625y^2$.
18. $x - 5$; $x - 6$; $x - 15$.

Page 144

19. 6%; 5%; $4\frac{1}{2}\%$.
20. $y = 3x$.
21. y increases.
22. (a) $-12x - 15$. (b) $7x + 5$.
23. (a) 32. (c) 7. (e) 4.
- (b) 200. (d) 9. (f) 7.

Page 151

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|---------|---------|----------------------|----------------------|
| 1. 2. | 11. -4. | 21. 2. | 31. $-\frac{8}{3}$. |
| 2. 6. | 12. 2. | 22. -5. | 32. $-\frac{2}{3}$. |
| 3. -3. | 13. -1. | 23. 6. | 33. $-\frac{1}{3}$. |
| 4. -5. | 14. 3. | 24. 3. | 34. $-\frac{2}{3}$. |
| 5. 3. | 15. 5. | 25. 2. | 35. $\frac{5}{3}$. |
| 6. 2. | 16. 2. | 26. -3. | 36. -1. |
| 7. 1. | 17. 6. | 27. $\frac{1}{2}$. | 37. 7.3. |
| 8. 3. | 18. -1. | 28. 2. | 38. -15. |
| 9. 2. | 19. -3. | 29. 5. | 39. 5. |
| 10. -2. | 20. 2. | 30. $-\frac{1}{2}$. | 40. 10. |

Page 153

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|------------------------|--------------------|------------|
| 1. H , 15; F , 45. | 3. $2''$. | 5. $10'$. |
| 2. G , 18; F , 72. | 4. \$1050, \$7350. | 6. 5 mi. |

Page 154

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|----------------------------------|----------------|
| 7. J , $165'$; M , $495'$. | 10. 350 mi. |
| 8. $8''$, $32''$. | 11. 10 and 16. |
| 9. $36''$ by $18''$. | |

Page 155

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|-------------|-------------|-----------------------|
| 12. 11, 24. | 13. 25, 21. | 14. $50''$, $30''$. |
|-------------|-------------|-----------------------|

Page 156

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|-------------|--------------------|
| 15. 20, 37. | 17. 33 mi.; 66 mi. |
| 16. 17, 22. | 18. 60 ft. |

Page 158

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|-----------|------------|--------|------------|
| 1. 4. | 6. 4. | 11. 6. | 16. 6. |
| 2. 1. | 7. -3 . | 12. 4. | 17. 1. |
| 3. -6 . | 8. 5. | 13. 2. | 18. -1 . |
| 4. -2 . | 9. -10 . | 14. 3. | |
| 5. 3. | 10. 2. | 15. 4. | |

Page 159

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|------------|------------|----------|------------|
| 19. -5 . | 24. -2 . | 29. 24. | 34. 2. |
| 20. 2. | 25. 1. | 30. 4. | 35. 10. |
| 21. 18. | 26. 80. | 31. 6. | 36. -2 . |
| 22. -1 . | 27. 1001. | 32. 2.5. | |
| 23. 7. | 28. 9.7. | 33. 3. | |

Page 160

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|-------------|--------|---------------------|----------------------|
| 1. 9. | 6. 2. | 11. 7. | 16. -3 . |
| 2. 1. | 7. 4. | 12. -6 . | 17. 8. |
| 3. 6. | 8. 4. | 13. 9. | 18. 7. |
| 4. 1. | 9. 1. | 14. 2. | 19. -6 . |
| 5. 4. | 10. 2. | 15. 4. | 20. $-\frac{3}{7}$. |
| 21. -12 . | | 22. $\frac{1}{4}$. | |

Page 161

23. 5. 24. -1.
 25. By adding $-x$ to or subtracting $+x$ from both members.
 26. By adding -4 to or subtracting $+4$ from both members.
 27. No. No. Yes. 3. 28. 16. 29. 2.
 30. 17, 14, 11, 8, 5, 2, -1. Decreases. 3, 7.

Page 162

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|--------|---------|---------|---------|
| 1. 12. | 5. 65. | 9. 48. | 13. 2. |
| 2. 24. | 6. 126. | 10. 10. | 14. 20. |
| 3. 25. | 7. 12. | 11. 1. | |
| 4. 20. | 8. 75. | 12. 2. | |

Page 163

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|------------|-------------|----------------|--------------------------|
| 1. $7a$. | 7. a . | 13. $7n$. | 19. $2a$. |
| 2. $3b$. | 8. $-2b$. | 14. $3mn$. | 20. $-a$. |
| 3. $3a$. | 9. a . | 15. $2(a+b)$. | 21. $-a-b$. |
| 4. a . | 10. 0. | 16. $-9k$. | 22. $2m-n$. |
| 5. $6a$. | 11. $10n$. | 17. 0. | 23. $h+k$. |
| 6. $-2a$. | 12. $-9m$. | 18. $2n$. | 24. $-a + \frac{1}{2}$. |

Page 164

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|--------------------------|---------------------------|----------------------------|
| 1. $A = \frac{1}{2}bh$. | 4. $A = \frac{2}{7}r^2$. | 6. $r = \frac{g}{c}$. |
| 2. $V = lbh$. | | |
| 3. $v = 32t$. | 5. $A = \frac{m+n}{2}$. | 7. $k = \frac{m}{.6213}$. |

Page 165

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|---|---|
| 1. 60, 120, 480. | 2. 28, 56, 112. |
| 3. \$270, \$540, \$135, \$1080. | |
| 4. \$844.80, \$1049.60, \$1254.40, \$2918.40. | |
| 5. $42\frac{1}{4}$, 169,676. | 6. $42\frac{1}{2}$, 85, $127\frac{1}{2}$. |
| 7. 20¢, 30¢, 10¢, 20¢. A loss. | |
| 8. 10¢. A gain. | |
| 9. $s = p + c$. | $c = s - p$. |
| 10. $s = \$90$. | $c = \$1.50$. |
| 11. $c = l + s$. | $s = c - l$. |
| 12. \$6.50, \$12. | |
| 13. \$.01 p , \$12, \$24, \$56.12. | |
- Point off two places to the left.

Page 166

1. $p = \frac{C}{n}$.

2. $s = \frac{P}{3}$.

3. $b = \frac{A}{h}$.

4. $t = \frac{d}{v}$.

5. $d = \frac{c}{p}$.

6. $r = \frac{C}{2\pi}$.

7. $f = \frac{P}{W}$.

8. $N = \frac{W}{P}$.

9. $t = \frac{I}{pr}$.

10. $l = \frac{V}{wh}$.

11. $A = 60^\circ$.

12. $C = \frac{E}{R}$.

13. $h = \frac{V}{\pi r^2}$.

14. $h = \frac{S}{2\pi r}$.

15. $n = \frac{C}{.05}$.

16. $W = \frac{K}{h}$.

17. $s = S - r$.

18. $p = \frac{C - 11}{8}$.

19. $a = P - b - c$.

20. $l = \frac{P - 2w}{2}$.

Page 166

1. $x - 5, x - a, x + 20, x + n$.

2. $2l + 2w$.

3. $4s, \frac{s}{3}$.

4. $20c, ac, \frac{\$c}{5}, \frac{\$ac}{100}$.

5. $\frac{n}{12} \text{¢}, \frac{5n}{12} \text{¢}, \frac{nx}{12} \text{¢}$.

6. $50 - x$.

7. $15 - d$.

8. $5, \frac{m}{40}$.

Page 167

9. $10x, ax$.

10. $4y$.

11. 9 .

12. xy .

13. $100d, 10d$.

14. $6y + 2w$.

Page 168

1. 15 .

2. 1600 .

3. 4 .

4. $2.03; 6.09$.

5. 5 .

6. 4 .

7. $15, 30, 36$.

Page 169

8. 34 .

9. $832, 1044$.

10. 10 .

Page 170

1. $13, 14, 15$.

2. $21, 23, 25, 27$.

3. $34, 36$.

4. $19, 20, 21$.

Page 170

- | | |
|--------------|-------------------|
| 1. \$24,000. | 3. \$20,000. |
| 2. \$4,000. | 4. \$30,000 @ 5%. |
| | \$20,000 @ 6%. |

Page 171

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|-------------|--------------|--------------|
| 5. \$8,000. | 7. \$2,500. | 9. \$12,000. |
| 6. 6%. | 8. \$20,000. | |

Page 172

10. \$22,000.

Page 172

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|-------|------------------------|-----------|
| 1. 3. | 3. 9. | 5. 36 mi. |
| 2. 7. | 4. J , 20. B , 40. | 6. 4. |

Page 173

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|-------|-------------------|------------|
| 7. 3. | 8. 40 mi. per hr. | 9. 27, 33. |
|-------|-------------------|------------|

Page 174

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|---|--|
| 1. 18' by 6'. | 6. a , 30° ; b , 30° ; c , 120° . |
| 2. 3''. | 7. 6, 12, 8. |
| 3. 43 rds. | 8. $n + 6$; 21 in.; 28 in.; 16 in. |
| 4. A , 30° ; B , 60° ; C , 90° . | 9. 27° , 72° , 81° . |
| 5. 36° , 36° , 108° . | |

Page 175

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|-------------------------------|-------------------------------|---------|
| 10. 15° , 75° . | 11. 39° , 51° . | 12. 8'. |
|-------------------------------|-------------------------------|---------|

Page 175

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|-------------------|------------------|------------------|
| 1. 120 lb. @ 40¢. | 2. 20 lb. @ 80¢. | 3. 70 lb. @ 40¢. |
| 80 lb. @ 60¢. | 40 lb. @ 50¢. | 50 lb. @ 28¢. |

Page 176

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|----------------------|-------------|--|
| 4. $\frac{3}{4}$ qt. | 5. 1.2 qts. | 6. 15.09 qts. milk.
24.91 qts. cream. |
|----------------------|-------------|--|

Page 176

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|-------|------------------------|-------|-------|
| 1. 7. | 2. n , 12; d , 18. | 3. 3. | 4. 7. |
|-------|------------------------|-------|-------|

Page 177

5. n , 11; d , 16. 7. c , 628; a , 142; $30.9 + \text{¢}$.
 6. n , 10; d , 20; q , 20. 8. a , 752; c , 251.

Page 178

1. 17. 2. 12. 3. B , 11; A , 44.
 4. A , 24; B , 6. 6. M , 10; J , 22.
 5. A , 50; B , 10. 7. W , 10; J , 15.

Page 179

8. s , 5; f , 25.

Page 179

1. K , 12; H , 26. 4. Fd, \$40; Fk, \$90. 7. \$2,000; \$4,000.
 2. 10. 5. 58, 86. 8. y , \$750; 2nd. \$1250;
 3. \$172. 6. 19 ft.; 31 ft. e , \$1500.

Page 180

9. c , 6750; s , 13500; g , 33750. 13. 40 qts.
 10. A , \$20000; B , \$10000; C , \$5000.
 11. \$26. 14. w , \$24000; s , \$16000; d , \$8000.
 12. 4, 3. 15. 60 rds.; 10 rds.

Page 181

1. 19 ft.; 57 ft. 3. $6x$; 12. 6. 41.
 2. $8x - y + 6$; 16. 4. -4.4 . 7. 47.
 8. $-6h^3 + 23h^2 - 37h + 24$; -6 .
 9. $T = 2(lw + lh + wh)$.
 10. 448 sq. in.
 11. 8.

Page 182

12. Conditional for $x = 3$.
 13. 80, 40, 20. Halved.
 14. d , increases as t increases.

Page 184

1. $5x + 30$. 4. $2x^2 - 12x$.
 2. $7x - 21$. 5. $-5x - 35$.
 3. $3x^2 + 15x$. 6. $-4x - 10$.

7. $9x + 6$.
 8. $2x + 2y + 2z$.
 9. $3x^2 + 15xy + 3xz$.
 10. $x^2y + xy^2$.
 11. $3a^3b + 2a^2b^2 - a^3b^2$.
 12. $3m^3 + 3m^2n - 3m^2n^2$.
 13. $2x^4 + 2x^3 - 4x^2 + 2x$.
 14. $3x^5 + 6x^4 - 9x^3 - 6x$.
 15. $3s^3 - 3s^2m + 3s^2x - 9s^2$.
 16. $3x + 4x^2 - 5x^3$.
 17. $6x^2 - 9xy - 15y^2$.
 18. $2m^4n - 6m^3n^2 + 10m^2n^3$.
 19. $12x^3y^3 + 18x^2y^4 + 12x^3y^4 - 6x^2y^5$.
 20. $y^6 - 2y^5 + 4y^4 + y^3$.
 21. $4a^6 - 5a^5 + a^4$.
 22. $ab^2c^2 + a^2bc^2 + a^2b^2c$.
 23. $-15a^3b + 10a^2b^2 - 35ab^3$.
 24. $-24x^3 + 18x^5 - 18x^6 + 24x^7$.

Page 185

25. $2bc$.
 26. $5ab - 7ac + 2bc$.
 27. $2x - \frac{7}{4}y$.
 28. $22xy - 8xz$.
 29. $A^{12} + A^{11} - A^{10} - A^9$.
 30. $.125x^3 + .375x^4 - .3x^5$.

Page 186

1. $3(x + y)$.
 2. $4(h - 2k)$.
 3. $5(x - 3y)$.
 4. $8(x + 3y)$.
 5. $3(x + 3y)$.
 6. $x(y + z)$.
 7. $13(2x + 3y)$.
 8. $25(1 - 2x)$.
 9. $P(1 + rt)$.
 10. $\pi(R^2 - r^2)$.
 11. $xyz(1 + w)$.
 12. $4k(1 - k)$.
 13. $3x^3(1 + 2x)$.
 14. $3x^2(1 + 2y)$.
 15. $4abc(a + 2c)$.
 16. $\frac{1}{2}a(x + y)$.
 17. $\frac{1}{4}a(k + h)$.
 18. $.6(x - 2y)$.
 19. $9x^2(3x^2 - 2)$.
 20. $12x(3x^3 - 2)$.
 21. $2\pi r(r + h)$.
 22. $18x(4x^2 - 3)$.
 23. $\frac{1}{3}\pi h(r^2 + R^2)$.
 24. $.2y^2(y - 2b)$.
 25. $\pi r(r + l)$.
 26. $6x(x^2 - 2x + 4)$.
 27. $8(H^2 + 4HK + 2)$.
 28. $x(y + z + w)$.
 29. $x(x^3 + x + 1)$.
 30. $2x(x + 2b + 3)$.
 31. $5a^2(2a^2 + 5a - 9)$.
 32. $-x(x^2 - x + 1)$.
 33. $23(60 + 40 - 75)$.
 34. $13(48 + 36 + 49)$.
 35. $635(724 - 721)$.
 36. $63(150 + 100 - 200)$.
 37. $3.1416(8.432 - 6.432)$.
 38. $25¢(75 \text{ lb.} - 50 \text{ lb.})$.
 39. $4ab(1 - 3c + 4abc^2)$.
 40. $7(2x - 3a + 7bx)$.
 41. $2ab(a - b - ab)$.
 42. $3s(s + 2y + 5sy^2)$.
 43. $-mn(m + n + 3mn)$.

Page 187

44. $5(x^n + 2y^n)$.
 45. $6(x^m + 2y^m)$.
 46. $5x^n(4x^n + 9)$.
 47. $3hx^{2n}(1 - 2x^{2n})$.

48. $2h(x^{2a} - 3x^a + 4)$.
 49. $\frac{1}{3}K(h + a + b)$.
 50. $\frac{3}{4}(a^2 + b^2 - c^2)$.
 51. $.4(x + y - z)$.
 52. $.3(a - b + c)$.
 53. $x(x^3 + x^2 - x + 1)$.
 54. $3x(8x^3 - 12x^2 + 6x - 1)$.
 55. $3x(x + 3x^2 - 4x^3 + 5)$.
 56. $2xyz(z - 3x + 5y)$.
 57. $ax^2(y - 5a - 2a^2x^2y^2)$.
 58. $ab^2c(8ac + 4c^3 - 3b + 5a^4b^2)$.
 59. $5mnx(3m - 4x - 12m^2n^2x^3)$.
 60. $16st^2(s - 4t + 3s^2 + 6s^2t^3)$.
 61. $11xy^2(11xy + 4x^2 + 10y^2 - 3x^2y^3)$.
 62. $(a + b)(x + y)$.
 63. $(a - b)(5x - 3y)$.
 64. $3x$ and $x + y$.
 65. $3x$ and $2x + 3y$.
 $5y$ and $3x + 2y$.

Page 188

- | | | |
|-------------------|-----------------------|---|
| 1. $x^2 - 4$. | 14. $x^4 - 9$. | 27. $121s^2 - 9b^2$. |
| 2. $x^2 - 16$. | 15. $x^4 - 144$. | 28. $x^2 - 4m^2n^2$. |
| 3. $x^2 - 25$. | 16. $x^8 - 16$. | 29. $16a^2 - 49b^4$. |
| 4. $x^2 - 64$. | 17. $81 - x^6$. | 30. $4a^4 - 1$. |
| 5. $x^2 - 100$. | 18. $4a^2 - 1$. | 31. $1 - 4a^2b^4$. |
| 6. $x^2 - 144$. | 19. $9a^2 - 4$. | 32. $9x^4 - 4y^2$. |
| 7. $x^2 - 1$. | 20. $16x^2 - 9$. | 33. $25x^4y^2 - a^2b^2$. |
| 8. $x^2 - 49$. | 21. $25y^2 - 16$. | 34. $\frac{1}{4}a^2 - \frac{1}{9}b^2$. |
| 9. $x^2 - 121$. | 22. $36s^2 - 49$. | 35. $\frac{9}{16}x^2 - \frac{1}{4}$. |
| 10. $x^2 - 400$. | 23. $4 - 25x^2$. | 36. $\frac{1}{25}x^4 - \frac{9}{4}$. |
| 11. $x^2 - 9$. | 24. $25 - 9a^2$. | 37. $\frac{4}{9}x^4 - 16$. |
| 12. $a^2 - 36$. | 25. $100 - 49m^2$. | 38. $.25x^2 - .64y^2$. |
| 13. $n^2 - 81$. | 26. $16H^2 - 25K^2$. | 39. $.09a^4 - .16b^4$. |

Page 189

- | | | | |
|---------------------------|-----------|------------------------------|--------------|
| 41. 2496. | 44. 891. | 47. 3596. | 50. \$15.96. |
| 42. 875. | 45. 4851. | 48. 2484. | 51. \$8.64. |
| 43. 3599. | 46. 1596. | 49. \$48.75. | 52. \$35.91. |
| 53. 2496 sq. ft. | | 63. $a + b$ or $a - b$. | |
| 54. $.04x^2y^2 - .25$. | | 64. $x^2 + 3$ or $x^2 - 3$. | |
| 55. $.36H^2 - .0025K^2$. | | 65. $3x + 4$ or $3x - 4$. | |
| 56. $a^{2n} - 9$. | | 66. $6 + 5y$ or $6 - 5y$. | |
| 57. $a^{2x} - b^4$. | | 67. $x + y$ and $x - y$. | |
| 58. $9e^{4x} - 1$. | | 68. $H + 6$ and $H - 6$. | |
| 59. $.25x^2y^2 - .36$. | | 69. $8 + 2y$ and $8 - 2y$. | |
| 60. $49x^6y^2 - 9z^2$. | | 70. $a^4 - b^4$. | |
| 61. $a - b$. | | 71. $x^6 - y^4$. | |
| 62. $5 + x$. | | 72. $x^{10} - y^3$. | |

Page 190

1. $(x + 2)(x - 2)$.
2. $(x + 3)(x - 3)$.
3. $(x + 4)(x - 4)$.
4. $(x + 6)(x - 6)$.
5. $(x + 10)(x - 10)$.
6. $(x + 9)(x - 9)$.
7. $(7 + x)(7 - x)$.
8. $(12 + x)(12 - x)$.
9. $(x + y)(x - y)$.
10. $(s + 5)(s - 5)$.
11. $(1 + 4x)(1 - 4x)$.
12. $(1 + 7y)(1 - 7y)$.
13. $(4x + 3)(4x - 3)$.
14. $(5y + 4z)(5y - 4z)$.
15. $(2s + 7t)(2s - 7t)$.
16. $(7m + 11n)(7m - 11n)$.
17. $(9x + 5a)(9x - 5a)$.
18. $(12l + 11k)(12l - 11k)$.
19. $(5 + 4n)(5 - 4n)$.
20. $(10 + 7a)(10 - 7a)$.
21. $(6ab + 5c)(6ab - 5c)$.
22. $(x + \frac{1}{3})(x - \frac{1}{3})$.
23. $(x + \frac{1}{4})(x - \frac{1}{4})$.
24. $(\frac{1}{2}xy^2 + \frac{1}{5}z^3)(\frac{1}{2}xy^2 - \frac{1}{5}z^3)$.
25. $(\frac{3}{2}a + \frac{2}{3}b)(\frac{3}{2}a - \frac{2}{3}b)$.
26. $(4 + 3ts^2)(4 - 3ts^2)$.
27. $(8ab + 9c)(8ab - 9c)$.
28. $(s + 4ty)(s - 4ty)$.
29. $(6m + 5sty^3)(6m - 5sty^3)$.
30. $(ab^2 + 3)(ab^2 - 3)$.
31. $(2a + 3b)(2a - 3b)$.
32. $(4x + 5y)(4x - 5y)$.
33. $(x^2 + y^2)(x + y)(x - y)$.
34. $(y^2 + 1)(y + 1)(y - 1)$.
35. $(n^4 + m^4)(n^2 + m^2)(n + m)(n - m)$.
36. $(1 + .6x)(1 - .6x)$.
37. $(.2 + .5x)(.2 - .5x)$.
38. $(.3H + .4K)(.3H - .4K)$.
39. $(5h + \frac{1}{2}k)(5h - \frac{1}{2}k)$.

Page 191

40. 180.
41. 560.
42. 600.
43. 400.
44. 2800.
45. 8000.
46. 400000.
47. 863.
48. 1131.
49. 976.
50. 6847.
51. 73.6.
52. 1884.96.
53. $(.8x + .07y)(.8x - .07y)$.
54. $(.4x + \frac{1}{4}y)(.4x - \frac{1}{4}y)$.
55. $(x^n + y^m)(x^n - y^m)$.
56. $(12h^n + k^{2m})(12h^n - k^{2m})$.
57. $(\frac{5}{a} + \frac{9}{b})(\frac{5}{a} - \frac{9}{b})$.
58. $(\frac{4a}{b} + \frac{x}{7})(\frac{4a}{b} - \frac{x}{7})$.
59. $x(x + 4)(x - 4)$.
60. $5(x + 3)(x - 3)$.
61. $2(x + 4)(x - 4)$.
62. $x(x + 2)(x - 2)$.
63. $a(a + 4)(a - 4)$.
64. $e(e + 5)(e - 5)$.
65. $7e(e + 1)(e - 1)$.
66. $\pi(R + r)(R - r)$.
67. $2\pi R(R + 2H)(R - 2H)$.
68. $y(x^2y^2 + z)(x^2y^2 - z)$.
69. $2a(11m + 9xy)(11m - 9xy)$.
70. $x^3(y + 8)(y - 8)$.
71. $11x^2(x + 2)(x - 2)$.
72. $ab(x + 3y)(x - 3y)$.
73. $3s(3t + 4y)(3t - 4y)$.

Page 192

74. $(x + y + 5)(x + y - 5)$.
75. $(a - b + e)(a - b - e)$.
76. $(x + y + z)(x - y - z)$.
77. $(3a - 3b + 4)(3a - 3b - 4)$.
78. $(a + b + c)(a + b - c)$.
79. $(x + 1 + 2n)(x + 1 - 2n)$.
80. $(5 + 6c - 6d)(5 - 6c + 6d)$.
81. $(m + x - y)(m - x + y)$.
82. $(2s + 5a - 10b)(2s - 5a + 10b)$.
83. $(4ma - 4mb + 7c)(4ma - 4mb - 7c)$.
84. $(3x - 3y + 5)(3x - 3y - 5)$.
85. $(x - y + a + b)(x - y - a - b)$.
86. $(2x - 1 + 3m - n)(2x - 1 - 3m + n)$.

Page 193

- | | |
|----------------------------|-----------------------------------|
| 1. $x^2 + 9x + 14$. | 26. $12x^2 - 5x - 2$. |
| 2. $x^2 + 7x + 12$. | 27. $49y^2 - 14y + 1$. |
| 3. $x^2 + 11x + 30$. | 28. $99x^2 + 21x - 18$. |
| 4. $x^2 + 11x + 24$. | 29. $42x^2 - 15x - 72$. |
| 5. $x^2 + 10x + 9$. | 30. $1 - 2b - 15b^2$. |
| 6. $x^2 - 7x + 12$. | 31. $1 + b - 30b^2$. |
| 7. $x^2 - 7x + 10$. | 32. $4y^4 + 16y^2 + 15$. |
| 8. $a^2 - 12a + 36$. | 33. $48x^4 - 72x^2 - 21$. |
| 9. $K^2 - 10K + 16$. | 34. $15x^6 - 2x^3 - 24$. |
| 10. $a^2 - 2ab + b^2$. | 35. $45x^4 + 38x^2 - 35$. |
| 11. $3x^2 - 22x + 7$. | 36. $7x^2 - 19ax - 6a^2$. |
| 12. $x^2 - 2x - 3$. | 37. $2a^2 + ab - 6b^2$. |
| 13. $x^2 + 3ax - 10a^2$. | 38. $4x^2 - 8ax + 3a^2$. |
| 14. $m^2 + 13mn + 28n^2$. | 39. $5x^2 - 47xy - 30y^2$. |
| 15. $m^2 - 3mn - 40n^2$. | 40. $9 + 12a + 4a^2$. |
| 16. $A^2 - 3AB - 18B^2$. | 41. $6x^2 - 5xy - 6y^2$. |
| 17. $h^2k^2 - 3hk - 54$. | 42. $6s^2 + 5st + t^2$. |
| 18. $x^2y^2 - 4xy - 96$. | 43. $10a^2 - ax - 21x^2$. |
| 19. $6x^2 + 17x + 12$. | 44. $11x^2 + 19xy - 6y^2$. |
| 20. $12x^2 + 41x + 35$. | 45. $4a^2 + 20ab + 25b^2$. |
| 21. $5x^2 + 21x + 4$. | 46. $x^4 - 10x^2 - 600$. |
| 22. $3x^2 - 7x - 6$. | 47. $x^4 + 10x^2 - 2000$. |
| 23. $2x^2 - 5x - 25$. | 48. $18x^4y^2 - 15x^2yz + 3z^2$. |
| 24. $14a^2 - 19a - 3$. | 49. $33y^4 + 16y^2z - 9z^2$. |
| 25. $3y^2 - 4y + 1$. | 50. $35x^4 - 2x^2y^2 - y^4$. |

Page 194

51. $72 x^4 - 25 x^2 y^2 + 2 y^4$.
 52. $35 a^6 - 8 a^3 b - 3 b^2$.
 53. $60 x^4 + 52 x^2 y - 24 y^2$.
 54. $45 x^4 + 14 x^2 - 48$.
 55. $a^2 + 3 ab - 10 b^2$.
 56. $\frac{1}{6} x^2 + 4 x + 24$.
 57. $\frac{3}{8} x^2 - x - 32$.
 58. $a^2 - a + \frac{3}{8}$.
 59. $\frac{3}{4} k^2 + \frac{7}{8} k + \frac{1}{4}$.
 60. $x^2 - \frac{5}{2} x - 6$.
 61. $x^2 + \frac{1}{12} x - \frac{1}{2}$.
 62. $y^2 + .7 y + .1$.
 63. $h^2 - .07 h + .001$.
 64. $.12 y^2 - .07 xy - .1 x^2$.
 65. $x^{2a} + 9 x^a + 18$.
 66. $x^{2a} - 11 x^a + 28$.
 67. $e^{2x} - 2 e^x - 3$.
 68. $2 e^{2x} + 5 e^x - 12$.
 69. $4 x^{2a} - 7 x^a - 2$.
 70. $30 - e^x - e^{2x}$.

Page 195

1. $(x + 4)(x + 2)$.
 2. $(x + 5)(x + 4)$.
 3. $(x + 3)(x + 3)$.
 4. $(x - 5)(x - 2)$.
 5. $(y - 4)(y - 2)$.
 6. $(a - 2)(a - 1)$.
 7. $(x + 5)(x - 2)$.
 8. $(x + 3)(x + 1)$.
 9. $(x + 6)(x - 1)$.
 10. $(x - 7)(x - 2)$.
 11. $(x + 4)(x - 3)$.
 12. $(x + 5)(x - 3)$.
 13. $(x - 4)(x - 2)$.
 14. $(x + 7)(x - 2)$.

Page 196

15. $(x - 5)(x - 3)$.
 16. $(x + 11)(x - 2)$.
 17. $(x + 8)(x - 7)$.
 18. $(x - 9)(x - 3)$.
 19. $(x - 9)(x + 1)$.
 20. $(x + 9)(x + 1)$.
 21. $(x - 7)(x - 3)$.
 22. $(a - 7)(a - 6)$.
 23. $(a - 8)(a + 7)$.
 24. $(n - 11)(n - 8)$.
 25. $(n - 12)(n + 2)$.
 26. $(3 + x)(1 - x)$.
 27. $(5 - y)(2 + y)$.
 28. $(11 - y)(6 - y)$.
 29. $(1 - 5x)(1 + 2x)$.
 30. $(1 - 5y)(1 - 5y)$.
 31. $(y - 2b)(y + b)$.
 32. $(2x - 3)(x + 1)$.
 33. $(3y - 4)(2y + 1)$.
 34. $(3y + 5)(y - 3)$.
 35. $(2m + 7)(m - 3)$.
 36. $(5 + x)(2 - 3x)$.
 37. $(3R - 4)(R + 1)$.
 38. $(4x - 5)(x + 1)$.
 39. $(3x + 4)(x - 3)$.
 40. $(5x - 2)(2x + 3)$.
 41. $(6a - 1)(3a - 4)$.
 42. $(3x + 1)(x - 1)$.
 43. $(3H + 7)(H + 1)$.
 44. $(6a - 1)(2a + 1)$.
 45. $(3m - 1)(4m - 1)$.
 46. $(4y + x)(3y - x)$.
 47. $(3x - y)(3x - y)$.
 48. $(2x + 5y)(x - y)$.
 49. $(4m + 9n)(m + 2n)$.
 50. $(6m - s)(m - 5s)$.

51. $(2x - 3y)(2x - 3y)$.
 52. $(5a - 12b)(3a + 2b)$.
 53. $(2a + 3b)(a - 4b)$.
 54. $(3x + 2y)(x - 3y)$.
 55. $(2x - 3)(2x + 1)$.
 56. $(3a - 2b)(2a - 3b)$.
 57. $(x - \frac{1}{2})(x - \frac{1}{2})$.
 58. $(a + 12)(2a - 1)$.
 59. $(12x + 5)(x - 3)$.
 60. $(x^a + 5)(x^a + 3)$.
 61. $(e^x - 9)(e^x + 7)$.
 62. $(3a^n + b)(a^n - 3b)$.
 63. $(x + y + 7)(x + y + 3)$.
 64. $(x + y - 7)(x + y - 4)$.
 65. $(x + y + 7)(x + y - 5)$.
 66. $y(2x + 3)(x - 1)$.

Page 197

67. $x(3x + y)(2x - y)$.
 68. $2(3a - b)(a + 2b)$.
 69. $2(4 + x)(5 - x)$.
 70. $2(x - 7)(x + 2)$.
 71. $2y(4x + 3)(3x - 1)$.
 72. $2z(x - 3y)(x - 3y)$.
 73. $mn(2m - 3)(m - 8)$.
 74. $y(y - 3)(y - 3)$.
 75. $2(4x + 3)(x + 2)$.
 76. $2m(3m - 2)(m + 2)$.
 77. $(x + .3)(x + .4)$.
 78. $(x + .8)(x + .5)$.
 79. $(x - .9)(x + .3)$.
 80. $(x + .03)(x + .02)$.

Page 198

1. $x^2 + 2xy + y^2$.
 2. $x^2 + 10x + 25$.
 3. $x^2 + 16x + 64$.
 4. $x^2 + 24x + 144$.
 5. $x^2 + 2x + 1$.
 6. $x^2 + 4x + 4$.
 7. $x^2 + 6x + 9$.
 22. $b^2 - 2bc + c^2$.
 23. $x^4 + 24x^2 + 144$.
 24. $x^4 - 22x^2 + 121$.
 25. $9x^2 + 30x + 25$.
 26. $16x^2 + 24x + 9$.
 27. $25x^2 - 20x + 4$.
 28. $36x^2 - 12x + 1$.
 29. $9x^6 - 24x^3 + 16$.
 30. $16x^4 - 40x^2 + 25$.
 31. $x^2 - 6xy + 9y^2$.
 32. $b^2 + 6ab + 9a^2$.
 33. $x^2 + 4xy + 4y^2$.
 34. $4x^2 - 4xy + y^2$.
 35. $9a^2 + 6ab + b^2$.
 8. $x^2 + 8x + 16$.
 9. $x^2 + 12x + 36$.
 10. $x^2 + 14x + 49$.
 11. $b^2 + 2bc + c^2$.
 12. $x^2 - 2xy + y^2$.
 13. $x^2 - 10x + 25$.
 14. $x^2 - 16x + 64$.
 15. $x^2 - 24x + 144$.
 16. $x^2 - 2x + 1$.
 17. $x^2 - 4x + 4$.
 18. $x^2 - 6x + 9$.
 19. $x^2 - 8x + 16$.
 20. $x^2 - 12x + 36$.
 21. $x^2 - 14x + 49$.
 36. $4a^2 - 12ab + 9b^2$.
 37. $36x^2 + 12xy + y^2$.
 38. $16x^2 - 16xy + 4y^2$.
 39. $16x^2 - 8xy^2 + y^4$.
 40. $4x^6 - 4x^3y^6 + y^{12}$.
 41. $x^2y^2 + 20xy + 100$.
 42. $100 + 20xy + x^2y^2$.
 43. $4a^2b^2 - 20ab + 25$.
 44. $x^2y^2 + 4xy + 4$.
 45. $a^2 - 6amn + 9m^2n^2$.
 46. $B^4 - 8AB^2C + 16A^2C^2$.
 47. $16x^2 + 4x + .25$.
 48. $.0009x^2 + .0024x + .0016$.

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|--------------------------------------|-------------|--|----------------|
| 49. 841. | 52. 10816. | 55. 729. | 58. 1849. |
| 50. 2809. | 53. 104.04. | 56. 9801. | 59. 576. |
| 51. 169. | 54. 1521. | 57. 1369. | 60. 1,010,025. |
| 61. 9900.25. | | 66. $.04 a^4 - .2 a^2 y^2 + .25 y^4$. | |
| 62. 506.25. | | 67. $x^{2n} + 8 x^n + 16$. | |
| 63. $.04 - 1.6 x + 16 x^2$. | | 68. $x^{2n} - 14 x^n + 49$. | |
| 64. $.25 x^2 - 3 xy + 9 y^2$. | | 69. $x^{2n} + 2 x^n y^m + y^{2m}$. | |
| 65. $.09 x^4 - .3 x^2 y + .25 y^2$. | | 70. $e^{4x} + 8 e^{2x} + 16$. | |

Page 199

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|--|---------------------------------|
| 71. $x^2 + x + \frac{1}{4}$. | 76. $8 a^2 + 2$. |
| 72. $x^2 + \frac{1}{2} x + \frac{1}{16}$. | 77. $A^2 + 2 AB + B^2$. |
| 73. $x^2 - x + \frac{1}{4}$. | 78. (a) $x + 5$. (c) $x - 8$. |
| 74. $\frac{x^2}{4} + 3 x + 9$. | (b) $x - 5$. (d) $x + 7$. |
| 75. $\frac{1}{4} a^2 + \frac{1}{3} ab + \frac{1}{9} b^2$. | 80. $a + b$. |

Page 201

- | | |
|--|--------------------------------------|
| 1. $3(x + 3)(x - 3)$. | 4. $(4 x^2 + 1)(2 x + 1)(2 x - 1)$. |
| 2. $16(2 x + y)(2 x - y)$. | 5. $(x^2 + a^2)(x + a)(x - a)$. |
| 3. $ax(x + a)(x - a)$. | 6. $(x^4 + y^2)(x^2 + y)(x^2 - y)$. |
| 7. $a^4(a^2 + 1)(a + 1)(a - 1)$. | |
| 8. $(m^4 + 1)(m^2 + 1)(m + 1)(m - 1)$. | |
| 9. $K^2(1 + K^2)(1 + K)(1 - K)$. | |
| 10. $(m^2 n^2 + 9 x^2)(mn + 3 x)(mn - 3 x)$. | |
| 11. $2(4 m^2 + 9 a^2 b^2)(2 m + 3 ab)(2 m - 3 ab)$. | |
| 12. $4 x^2 y^3 t(a + b)(a - b)$. | |
| 13. $3 m(9 + 11 m)(1 - 11 m)$. | |
| 14. $3 h k(9 + h^2)(3 + h)(3 - h)$. | |
| 15. $a(x^2 + 8 a)(x^2 - 8 a)$. | |
| 16. $(m^6 + n^4)(m^3 + n^2)(m^3 - n^2)$. | |
| 17. $x(x + 4)(x - 4)$. | |
| 18. $.4 x^3(x + .4)(x - .4)$. | |
| 19. $x(x + 4)^2$. | 26. $2(m + 6)(m + 2)$. |
| 20. $x(x - 7)^2$. | 27. $2(s - 3)^2$. |
| 21. $(3 x + 7)^2$. | 28. $3 x(2 x - 1)(x + 3)$. |
| 22. $(3 x - 5)(2 x + 1)$. | 29. $2 x(x - 3)(x + 1)$. |
| 23. $(3 x + 1)(x - 6)$. | 30. $m x(x + 2 - 6 m)$. |
| 24. $3 x(x - y + 3 z)$. | 31. $(11 x - 2)(x - 3)$. |
| 25. $a(x - 1)^2$. | 32. $(3 + 2 x)(1 - 5 x)$. |

Page 202

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|---------------------------|----------------------------|
| 33. $m(1 - 3m)^2$. | 43. $2x(3x - 7)(2x + 3)$. |
| 34. $(m - n)(m - 2n)$. | 44. $3x(x + 5)^2$. |
| 35. $3(2x - y)(x - 2y)$. | 45. $5x(x - 3y)^2$. |
| 36. $4x(x - 1)(x - 3)$. | 46. $2(x - 3)(x - 2)$. |
| 37. $a(x - a)^2$. | 47. $3m(x + 6)^2$. |
| 38. $ax(x - 3)(x + 2)$. | 48. $x^3 + x^2 + x + 1$. |
| 39. $4y(3x + 1)^2$. | 49. $2m^2 + m - 4$. |
| 40. $4a(m + 3)(m + 2)$. | 50. $6m + 6$. |
| 41. $5x(a - 5)(a - 1)$. | 51. $x - 3$. |
| 42. $mx(x - 2m)^2$. | |

True-False

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|---------------|---------------|---------------|---------------|---------------|
| 1. <i>f</i> . | 3. <i>t</i> . | 5. <i>t</i> . | 7. <i>f</i> . | 9. <i>t</i> . |
| 2. <i>f</i> . | 4. <i>f</i> . | 6. <i>f</i> . | 8. <i>f</i> . | |

Page 203

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|----------------|----------------|----------------|----------------|
| 10. <i>f</i> . | 13. <i>t</i> . | 16. <i>f</i> . | 19. <i>f</i> . |
| 11. <i>t</i> . | 14. <i>t</i> . | 17. <i>t</i> . | 20. <i>f</i> . |
| 12. <i>f</i> . | 15. <i>f</i> . | 18. <i>f</i> . | |

Page 204

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|--------------------------|---|
| 1. $(c + d)(a - 2)$. | 10. $2(2m + n)(4a - 3b)$. |
| 2. $(y + b)(x - a)$. | 11. $3s(5s + r)(r - 3n)$. |
| 3. $(a + 2m)(x - 3y)$. | 12. $kt(4t + s)(s - 3w)$. |
| 4. $(y - 3)(5x + 2m)$. | 13. $(a + b)(a + b + 3)$. |
| 5. $(x - 4a)(2x + 3n)$. | 14. $(a - b)(h - k)$. |
| 6. $(y + 4)(6x - 1)$. | 15. $(y - z)(x + w)$. |
| 7. $(x - 2y)(5x - 3)$. | 16. $(x + 6)(x - 5y)(x - \frac{5}{2}y)$. |
| 8. $(m + 3n)(x - 4y)$. | 17. $3(a + b + c)(a + 2b + 3c)$. |
| 9. $2(x - 3a)(2x + 1)$. | 18. $(2x - 3z)(x - y)$. |
| 19. $(x + 3)(x - .5y)$. | |

Page 205

- $(x - y + 4)(x - y - 4)$.
- $(5a + b + 3x)(5a + b - 3x)$.
- $(9m - n + 6c)(9m - n - 6c)$.
- $(4 + x + y)(4 - x - y)$.
- $(5a + 2b - c)(5a - 2b + c)$.
- $(3m + 4n - 5)(3m - 4n + 5)$.

Page 206

7. $(11a + 1 + 7b)(11a + 1 - 7b)$.
8. $(6x + 3z + 7y)(6x + 3z - 7y)$.
9. $(10 + ab + 3c)(10 - ab - 3c)$.
10. $(s - 5 + 12a)(s - 5 - 12a)$.
11. $(1 - 3a + 7b)(1 - 3a - 7b)$.
12. $(x + 1 + y - z)(x + 1 - y + z)$.
13. $(b + a - 1)(b - a + 1)$.
14. $(a + b - c)(a - b + c)$.
15. $(a + x - 1)(a - x + 1)$.
16. $(H + 2K + 4)(H + 2K - 4)$.
17. $(2xy^2 + 1 - 3x)(2xy^2 - 1 + 3x)$.
18. $(1 + a - b)(1 - a + b)$.
19. $(a + b - 1)(a - b + 1)$.
20. $(x^a + 1 + 2b^m)(x^a + 1 - 2b^m)$.
21. $(A - 4B + 2C)(A - 4B - 2C)$.

Page 206

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|---------------------------|-------------------------------|
| 1. $2a^2 + 9am + 9m^2$. | 5. $x^2 - 36$. |
| 2. $15x^2 - 11x - 14$. | 6. $3x^2 + xy - 10y^2$. |
| 3. $4a^2 - 12a + 9$. | 7. $14y^2 - cy - 3c^2$. |
| 4. $x^2 + 15x - 16$. | 8. 6561. |
| 9. $9a^2 - 12a + 4$. | |
| 10. 4899. | 15. $a^2 + 2ab + b^2 - c^2$. |
| 11. $a^2bx + 2abx + 3ab$ | 16. $6a^2 + a - 35$. |
| 12. $m^2 - n^4$. | 17. 2304. |
| 13. $6a^2 - 36a$. | 18. 9999. |
| 14. $2a^2 + 4ab + 2b^2$. | 19. $9m^2 + 6mn + n^2$. |

Page 207

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|--------------------------------|-----------------------------|
| 20. $15a^4 - 24a^2m - 12m^2$. | 26. $x - y^2 - 1$. |
| 21. $x - 5$. | 27. $a - b + x$. |
| 22. $x^2 + 2xy^2 + y^4$. | 28. $x - 5y$. |
| 23. $9x^4 - 6x^2y^3 + y^6$. | 29. $2x^2 - y^2$. |
| 24. $3x - 1$. | 30. $2x + 7$. |
| 25. $a - 3b$. | 31. $m^4 - 2m^2n^2 + n^4$. |

Page 207

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|---------------------------|------------------------|
| 1. $a(x^2 - 2ax - 3)$. | 3. $a(x - a)^2$. |
| 2. $2b(2b^2 + 3a - 5b)$. | 4. $3(x + 3)(x - 3)$. |

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|---------------------------|-----------------------------|
| 5. $2a(a+4)(a-4)$. | 13. $ax(x-3)(x+2)$. |
| 6. $(a-5)(a+2)$. | 14. $by(y-2)(y+1)$. |
| 7. $(2n-5m)^2$. | 15. $(a^2+x^2)(a+x)(a-x)$. |
| 8. $3(a-2)(a+1)$. | 16. $2(x-3)(x-2)$. |
| 9. $2x(x-2)^2$. | 17. $16(2x+y)(2x-y)$. |
| 10. $x^2(x+4)(x-4)$. | 18. $mx(x-2m)^2$. |
| 11. $(x^2+a)(x^2-a)$. | 19. $5x(a-5)(a-1)$. |
| 12. $4(2a^2+1)(2a^2-1)$. | 20. $4a(m+3)(m+2)$. |

Page 208

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|------------------------------|----------------------------------|
| 21. $(3x+4y)(3x-4y)$. | 49. $(a^2-7)^2$. |
| 22. $(c+9)(c-6)$. | 50. $(9+c^2)(3+c)(3-c)$. |
| 23. $r^2s^2(1+2rs)(1-2rs)$. | 51. $5c(c+7)(c-4)$. |
| 24. $(a-4)(a+3)$. | 52. $(2x+9)(x+2)$. |
| 25. $2(2+3m)(2-3m)$. | 53. $x(x^2+y^2)(x+y)(x-y)$. |
| 26. $(3a+2)(2a+1)$. | 54. $(2l+7)(2l+3)$. |
| 27. $x^2(x+1)(x-1)$. | 55. $(2-5x)(1+3x)$. |
| 28. $(m-9)(m-2)$. | 56. $2(2x+1)(x+2)$. |
| 29. $(3p+q)(2p-q)$. | 57. $x(x+3)(x-3)$. |
| 30. $(2a+b)(a-b)$. | 58. $x^2(1+3x)(1-2x)$. |
| 31. $(a+3b)(2a-b)$. | 59. $5a(a-5b)(a+3b)$. |
| 32. $(x+5yz)(x-5yz)$. | 60. $(7m-2)(2m-5)$. |
| 33. $(m+4)(m-3)$. | 61. $(3x-y)(x-3y)$. |
| 34. $9a(a+1)(a-1)$. | 62. $x(3a+5)(2a-1)$. |
| 35. $(2s-5w)^2$. | 63. $(4+3abx^2)(4-3abx^2)$. |
| 36. $a^2b^2(5+4a)(5-4a)$. | 64. $2c(7+c)^2$. |
| 37. $(1+3ab)^2$. | 65. $(2x-18+3a)(2x-18-3a)$. |
| 38. $(a-2)(a-8)$. | 66. $a(3c+8d)(3c-8d)$. |
| 39. $(x-9)(x+2)$. | 67. $(4a+3)(9a-1)$. |
| 40. $(9a+b)^2$. | 68. $(x^3-12)(x^3-3)$. |
| 41. $2c(c-5)^2$. | 69. $7x(x-9)(x+4)$. |
| 42. $(a^2+4)(a+2)(a-2)$. | 70. $(a-b+c)(a-b-c)$. |
| 43. $5r(4r-r)^2$. | 71. $(a+b+c)(a+b-c)$. |
| 44. $(x-9)(x+8)$. | 72. $(x+3r+1)(x-3r-1)$. |
| 45. $5x(x+2y)(x-2y)$. | 73. $(x^2+y^2+ab)(x^2+y^2-ab)$. |
| 46. $(k+9h)(k-4h)$. | 74. $(2a-3b+3c^2)(2a-3b-3c^2)$. |
| 47. $(11x+7y)(11x-7y)$. | 75. $(a-c-2x)^2$. |
| 48. $2(x+8)(x-3)$. | 76. $\frac{1}{3}(x+y)(a+1)$. |

Page 209

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|----------------------------------|------------------------|
| 77. $(e^m+h^{2n})(e^m-h^{2n})$. | 79. $ex(3h+1)(3h-1)$. |
| 78. $4(x^2+y^2)(x+y)(x-y)$. | 80. $.7(x-3y+6z)$. |

Page 209

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|--------------|--------------|-----------------|------------|
| 1. $m + n$. | 3. 6. | 5. $a(m + n)$. | 7. $s/2$. |
| 2. $n + 1$. | 4. $a + b$. | 6. $-a$. | |

Page 210

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|----------------|-----------------|-----------------|
| 8. $b + c$. | 14. $m - 5$. | 20. $c - 2$. |
| 9. $a + b$. | 15. $b - 4a$. | 21. $a + 6$. |
| 10. $b + 2c$. | 16. $1 - 3b$. | 22. $a + 5$. |
| 11. $a + 3$. | 17. $3b + 4a$. | 23. $n + 7$. |
| 12. a . | 18. $a + 3$. | 24. $a - 5b$. |
| 13. $c + 2$. | 19. $b + 6$. | 25. $3k + 8n$. |

Page 212

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|---------------------------------|------------------------------------|-----------------------------------|
| 1. $-3, -4$. | 13. $a, -a$. | 25. $3, -\frac{1}{2}$. |
| 2. $-4, -5$. | 14. $0, 6$. | 26. $1, -\frac{5}{2}$. |
| 3. $-1, -5$. | 15. $0, 7$. | 27. $\frac{4}{3}, -\frac{3}{2}$. |
| 4. $2, 3$. | 16. $\frac{1}{3}, -2$. | 28. $7, \frac{1}{4}$. |
| 5. $5, -4$. | 17. $-\frac{2}{3}, -\frac{7}{2}$. | 29. $3, -\frac{7}{2}$. |
| 6. $5, 6$. | 18. $-b, -b/3$. | 30. $-3, \frac{5}{2}$. |
| 7. $5, -8$. | 19. $-2, -\frac{1}{2}$. | 31. $\frac{1}{2}, -\frac{3}{4}$. |
| 8. $4, 9$. | 20. $-1, -4$. | 32. $\frac{2}{3}, -\frac{7}{4}$. |
| 9. $5, 10$. | 21. $-3, -6$. | 33. $\frac{1}{6}, -1$. |
| 10. $2, -8$. | 22. $-3, -9$. | 34. $5a/2, -2a$. |
| 11. $a, -3a$. | 23. $1, -3$. | 35. $2b, -6b$. |
| 12. $2ab, -2ab$. | 24. $0, 8$. | 36. $a/5, -a$. |
| 37. $4, 5, 6$ or $-7, -6, -5$. | | 39. $5, -7$. |
| 38. $2, 3$ or $-2, -3$. | | 40. $8, -3$. |

Page 213

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|--|--------------------------------|
| 41. $2, -\frac{2}{3}$. | 46. $x^2 - 8x + 15 = 0$. |
| 42. $5, -5$. | 47. $x^2 - 3x = 0$. |
| 43. $5, 8$. | 48. $x^3 + x^2 - 4x - 4 = 0$. |
| 44. $4, 12$. | 49. $x^3 - 6x^2 + 8x = 0$. |
| 50. $x^3 - (a + b + c)x^2 + (ab + ac + bc)x - abc = 0$. | |

Page 215

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|------------------------------------|--------------------------------------|
| 1. $-a^4 + 2a^3 + 3a^2 - 4a - 4$. | |
| 2. $(a^n + 3)^2$. | 4. $2x^2 - 3x$. |
| 3. $43, 15$. | 5. $15^\circ, 55^\circ, 110^\circ$. |

Page 216

6. \$14,384. 8. (a) $(a+1)^2(a-1)^2$.
 (b) $(4m-1)(3m-1)$.
 (c) $(a^m+1)(a^m-1)$.
 7. $\frac{abc}{x+y}, \frac{1}{2}$. 15. $3x+9=5x-6$.
 9. A, 160; I, 480. 12. -56. 16. $5(x-y)-z=w-8$.
 10. $x+40$. 13. $a-b+9=h$. 17. Yes. No.
 11. 800. 14. $x-10=15-x$. 19. Latter by 252.
 18. 12.6

Page 217

20. $25q+20-10d$.
 21. $4\frac{1}{8}, \frac{c}{6}, \frac{10d+c}{12}$.
 22. $.2x-.5y$.
 23. (a) $(3x+2y)(2x+3y)$.
 (b) $(a-2b)(a+b)$.
 (c) $6(x+y)(x-y)$.
 (d) $2(x^2+4)(x+2)(x-2)$.
 (e) $(4x+15)(2x+1)$.
 (f) $(y-19)(y+13)$.
 24. 518.4.
 26. $20x^2+18x-14$; 814.
 27. x^3+3x^2+2x . $6x^2+12x+4$. $12x+12$. 60, 94, 48.
 28. $1-x+x^2-x^3+x^4-\dots$

Page 218

29. 27' by 78', 36' by 78'.

Page 221

1. $\frac{1}{2x}$. 5. $\frac{2b^3}{3a}$. 9. $\frac{2c}{a}$. 13. $\frac{-3x^2}{y}$.
 2. $\frac{a}{3}$. 6. $\frac{n}{2m}$. 10. $-x$. 15. $-5mn$.
 3. $\frac{1}{3a}$. 7. $\frac{a^2b}{2}$. 11. $-\frac{x}{2}$.
 4. $\frac{3c}{x}$. 8. $\frac{5ab}{3}$. 12. $-\frac{2b}{a}$.

Page 222

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|------------------------------|------------------------------------|-------------------------------|
| 16. $\frac{3 ac^4}{4 b^2}.$ | 27. $\frac{3}{2(m-n)}.$ | 38. $\frac{16 xy(m+n)}{m-n}.$ |
| 17. $\frac{4 m}{9 x}.$ | 28. $\frac{2}{a(x-y)}.$ | 39. $\frac{b+c}{c(b-c)}.$ |
| 18. $\frac{3 ax}{7}.$ | 29. $\frac{2 x(x-y)}{5 y^2(x+y)}.$ | 40. $\frac{1-4 c}{2 a}.$ |
| 19. $\frac{3 df}{11 k}.$ | 30. $\frac{1}{6 x^2 y(x-y)}.$ | 41. $\frac{x+2}{x+3}.$ |
| 20. $\frac{2 x^2}{3 y^2 z}.$ | 31. $\frac{xy^3}{x+y}.$ | 42. $\frac{y-1}{y+2}.$ |
| 21. $\frac{4}{R}.$ | 32. $\frac{m-n}{m+n}.$ | 43. $\frac{x-4}{x+4}.$ |
| 22. $r.$ | 33. $\frac{m-3 n}{3 a}.$ | 44. $\frac{x-3}{x+5}.$ |
| 23. $\frac{xy^2}{x-y}.$ | 34. $\frac{y-1}{4}.$ | 45. $\frac{x+5}{x+2}.$ |
| 24. $\frac{m(m-n)}{5 n}.$ | 35. $\frac{2 a}{3 a-b}.$ | 46. $\frac{x-9}{x-10}.$ |
| 25. $\frac{b}{3 a}.$ | 36. $-\frac{3}{2}.$ | |
| 26. $\frac{c-d}{4}.$ | 37. $2 a(2 \hat{x}-d).$ | |

Page 223

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|--------------------------|----------------------------|--------------------------|---------------------------|
| 47. $\frac{x-2}{x+2}.$ | 50. $\frac{x+7}{2 x+1}.$ | 53. 2. | 56. $\frac{2}{5}.$ Yes. |
| 48. $\frac{4 x-1}{x+3}.$ | 51. $\frac{a+3 b}{a+2 b}.$ | 54. $\frac{2+5}{3+9}.$ | 58. $\frac{h+k}{h-k}.$ 3. |
| 49. $\frac{x-1}{3 x-2}.$ | 52. 12. | 55. $\frac{10}{13}.$ No. | |

Page 225

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|---------------------|----------------------|----------------------|------------------------------|
| 1. 1. | 4. $\frac{4 x}{3}.$ | 7. 2. | 10. $\frac{8}{9}.$ |
| 2. $\frac{2}{3^3}.$ | 5. 20. | 8. $\frac{50}{9 x}.$ | 11. $\frac{25 xy^2}{6 z^3}.$ |
| 3. $6\frac{2}{5}.$ | 6. $\frac{16 x}{5}.$ | 9. $\frac{4}{x}.$ | 12. $\frac{6 ab^2}{e}.$ |

Page 226

13. $3x^3y.$

14. 14.

15. $\frac{8abc}{3d^2}.$

16. 4.

17. $6amn^2.$

18. $\frac{16}{3x}.$

19. $\frac{2401}{18}.$

20. $-\frac{44a^4}{9x}.$

21. $\frac{8a^2n}{mx}.$

22. $-\frac{3mn}{a^2}.$

23. $4xy.$

24. $\frac{2a}{15}.$

25. $-\frac{2a^4xy}{3m^2n^3}.$

26. $75a^3.$

27. $\frac{3(x-y)}{2}.$

28. $\frac{2(x+2)}{3}.$

29. $\frac{4y}{3}.$

30. $\frac{(x+4)(x-3)}{4}.$

31. $\frac{x-2}{x(a+1)}.$

32. 1.

33. $\frac{x+9}{3}.$

34. $\frac{(x-y)^2}{3y}.$

Page 228

1. $\frac{10x}{y}.$

2. $\frac{25ax^2y}{b^2}.$

3. $\frac{9bm}{cx}.$

4. $\frac{5x^2y}{6}.$

5. $a.$

6. 1.

7. $\frac{1}{K+1}.$

8. $3(H+2).$

9. $\frac{x-3}{3}.$

10. $\frac{1}{x-y}.$

Page 229

11. $\frac{x(a+2x)}{a^2}.$

12. $\frac{3(a-b)^2}{b}.$

13. $3(a+x).$

14. $\frac{(x+3)(x-1)}{x}.$

15. $\frac{m^2-1}{m^3}.$

16. $\frac{1}{x+y}.$

17. $\frac{1}{3(x-y)}.$

18. $\frac{y(x+2y)}{x^2}; \frac{18}{25}.$

19. $\frac{1}{x^2+2x+1}; \frac{1}{a+b+c}.$

20. $\frac{45x^2-20y^2}{6x^2y-4xy^2}; \frac{4x^2y^2}{30x+20y}; \frac{xy}{x+y}.$

21. $\frac{2a+1}{2a+3}.$

22. $\frac{1}{a}.$

23. $a+b.$

24. $\frac{3(a-3x)}{5a(x-3a)}.$

25. $-\frac{x(x+y)}{2y}.$

26. $\frac{H}{H-2}.$

27. 1.

Page 230

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|---|-----------------------------------|----------------------------------|
| 28. $\frac{4a-1}{2a-1}$. | 32. $\frac{1}{c}$. | 36. $\frac{(2x+1)^2}{(x+1)^2}$. |
| 29. Yes. $\frac{7}{32}$. | 33. -1 . | 37. 1 . |
| 30. $\frac{b}{a^2+4b^2}$; $\frac{3}{52}$. | 34. $\frac{(3x-2)^2}{(2x-3)^2}$. | 38. $\frac{x-y}{y}$. |
| 31. $x-2$. | 35. $\frac{x+9}{x+5}$. | 39. $\frac{1}{y}$. |

Page 231

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|--------|--------------|-----------------|------------------|
| 1. 12. | 3. $10x$. | 5. $39x$. | 7. $24x^3yz^2$. |
| 2. 24. | 4. $30x^2$. | 6. $20x^2y^2$. | 8. $15a^3b^3$. |

Page 232

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|---------------------|--------------------|-----------------------|
| 9. $xyzw$. | 16. $xy(x+y)$. | 23. 720. |
| 10. $12x(x-2)$. | 17. $a(a^2-b^2)$. | 24. 24. |
| 11. x^2-y^2 . | 18. $ab(a-b)^3$. | 25. x^2-1 . |
| 12. x^2-y^2 . | 19. $60(a-b)^2$. | 26. $12n^2x^2y^2$. |
| 13. $xy(x-y)$. | 20. $2x(x-y)$. | 27. $5(x^2-1)$. |
| 14. $(x+y)^2$. | 21. $12(x^2-9)$. | 28. $3(4-x^2)$. |
| 15. $3y(x^2-y^2)$. | 22. 12. | 29. $n^2m^2(m+n)^2$. |

Page 236

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|-----------------------|----------------------------------|-----------------------------|
| 1. $1\frac{7}{16}$. | 8. $\frac{11}{6x}$. | 15. $\frac{4b+7bc}{9c^2}$. |
| 2. $-6\frac{2}{7}$. | 9. $-\frac{107}{20a}$. | 16. $\frac{5x+y}{6}$. |
| 3. $5\frac{1}{5}$. | 10. $\frac{5+a}{2a^2}$. | 17. $\frac{a+5b}{12}$. |
| 4. $\frac{83}{96}$. | 11. $\frac{19x-6}{3x^2}$. | 18. $\frac{19a+9b}{15}$. |
| 5. $\frac{7}{24}$. | 12. $\frac{60b-15a+20}{18ab}$. | 19. $-\frac{m+8n}{6}$. |
| 6. $-1\frac{7}{12}$. | 13. $\frac{31a}{10b}$. | 20. $\frac{4x-37y}{12}$. |
| 7. $7\frac{3}{8}$. | 14. $\frac{4abc-2c+ab}{2bc^2}$. | |

Page 237

21. $\frac{m-n}{30}$.
22. $\frac{14a-3b}{6c}$.
23. $\frac{23x-52y+15}{10x}$.
24. $\frac{15m-22n+12}{14m}$.
25. $\frac{2ac+bc-a^2}{abc}$.
26. $\frac{12x^2-7xy+8y^2}{6x^2y^2}$.
27. $\frac{x^2y-6y^2-2x^4}{6x^2y^2}$.
28. $\frac{4a^2-1}{a^2}$.
29. $\frac{5a^3+2a-28}{6a^2}$.
30. $\frac{7b^2+6b-2}{6x}$.
31. $\frac{17ay+3a-1}{5y^2}$.
32. $\frac{9a-12b}{a(a-b)}$.
33. $\frac{2x-8y}{x^2-y^2}$.

34. $\frac{2a^2+6ab-4b^2}{a^2-4b^2}$.
35. $\frac{3-2x+2y}{x^2-y^2}$.
36. $\frac{9x+8y}{x^2-4y^2}$.
37. $\frac{85x^3-30x^2-32x-42}{30x^3}$.
38. $\frac{2a-5b}{a^2-b^2}$.
39. $\frac{5+3a+3b+6a^2-6ab}{a^2-b^2}$.
40. $\frac{34a^2-3a-63}{6a(a+3)}$.
41. $\frac{4a^2-14ab-3b^2}{(2a+b)(a-2b)}$.
42. $\frac{5x^2-3x}{(x-3)(x+1)}$.
43. $\frac{5xy^2+10xy-2y^2-2y+3}{y^2+3y+2}$.
44. $\frac{12a^2-4ab-12b^2}{(2a-b)(a-3b)}$.
45. 0.

Page 239

1. $\frac{8}{3}$.
2. $\frac{a^2+1}{a}$.
3. $\frac{11x}{3}$.
4. $\frac{18x^2-2x}{3}$.
5. $\frac{8xy+12+y}{4}$.
6. $\frac{10-15x}{3x}$.
7. $\frac{B^2-4A^2C}{4A}$.
8. $\frac{\pi R^2-\pi r^2}{R^2}$.
9. $\frac{19x-6}{6}$.
10. $\frac{40-7x}{10}$.
11. $\frac{7x-4}{3}$.
12. $\frac{17-x}{5}$.
13. $\frac{3a^2+3a-1}{a}$.
14. $\frac{2x^2}{5}$.
15. $\frac{4x^2-3x^3}{12}$.
16. $\frac{5x^2-4x-3}{x-1}$.
17. $\frac{2c^2}{c+d}$.
18. $\frac{2x^2-2x+1}{2x-1}$.

Page 240

19. $\frac{5a^2 - 11a - 9}{a - 3}.$

21. $\frac{a^3 - 3a^2 + 11a - 8}{a - 1}.$

20. $\frac{2xy}{x + y}.$

22. $\frac{x^3}{x + y}.$

Page 240

1. $-\frac{3}{5}$ or $-\frac{3}{5}.$

7. $\frac{1 - x}{x - 2}$ or $-\frac{x - 1}{x - 2}.$

2. $\frac{2a}{x}$ or $-\frac{-2a}{x}.$

8. $\frac{x - 3}{x - 5}$ or $-\frac{3 - x}{x - 5}.$

3. $\frac{x}{2}$ or $-\frac{-x}{2}.$

9. $-\frac{2x}{y - x}$ or $\frac{-2x}{y - x}.$

4. $\frac{a}{b - a}$ or $-\frac{-a}{b - a}.$

10. $\frac{a - b}{-a - b}$ or $-\frac{-a + b}{-a - b}.$

5. $\frac{-ab}{a - b}$ or $-\frac{ab}{a - b}.$

11. $\frac{2m - n}{-n - 2m}$ or $-\frac{-2m + n}{-n - 2m}.$

6. $\frac{x^2}{x^2 - y^2}$ or $-\frac{-x^2}{x^2 - y^2}.$

12. $\frac{mn - n^2}{m^2 - n^2}$ or $-\frac{n^2 - mn}{n^2 - m^2}.$

Page 241

1. $\frac{1}{x - 2}.$

7. $\frac{3b^2}{b^2 - 1}.$

2. $\frac{2}{3 - x}.$

8. $\frac{-20}{x^2 - 16}.$

3. $\frac{2a^3 - 2a^2 + 3a + 3}{a(a^2 - 1)}.$

9. $\frac{x^2 + 49x + 2}{x^2 - 49}.$

4. $\frac{5a^2 - 25a - 3}{a^2 - 25}.$

10. $\frac{2a^2 - 11a + 2}{a - 6}.$

5. $\frac{x^2 + 3xy + y^2}{x^2 - y^2}.$

11. $\frac{4y^4 - 37y^2 - 6y}{y^2 - 9}.$

6. $\frac{2H + 1}{1 - H^2}.$

12. $\frac{6a^3 - 7a - 3}{a^2 - 1}.$

Page 242

13. $\frac{5 - 6a}{1 - a^2}.$

15. $\frac{3a^2 - 2a - 3}{a^2 - 1}.$

14. $\frac{1}{2 + a}.$

16. 0.

17. $-\frac{x}{x+y}$.
 18. $\frac{48-8x}{9-x^2}$.
 19. $\frac{3b^3-2a^2b+9ab^2-2a^3}{(a+b)(a-b)(3a+b)}$.
 20. $\frac{7y^2+9y+26}{-24(y-2)(y+1)}$.
 21. $\frac{a-3b}{a^2-b^2}$.
 22. $-\frac{a+9}{(a+2)(a-5)}$.
 23. $\frac{4x^2-2ax-4}{1-x^2}$.
 24. $\frac{Rr^2-RH}{(R^2-r^2)(R^2-H)}$.
 25. No.

Page 243

1. $\frac{5}{8}$.
 2. 8.
 3. $\frac{ac+xy}{cx}$.
 4. $\frac{2K}{c}$.
 5. $\frac{a+2}{3a+2}$.
 6. 1.
 7. 0.
 8. $a(a-b)(2a-b)$.
 9. $\frac{cd(a+b)}{ab(d-c)}$.
 10. 0.

Page 244

1. $\frac{3(x+1)}{x-1}$.
 2. $\frac{a-b}{a}$.
 3. $\frac{3(a-b)}{a}$.
 4. $\frac{2m+1}{m-1}$.
 5. $4-c$.
 6. $\frac{m+3}{m-3}$.
 7. $b^2(3a+b)$.

Page 245

8. $x-6$.
 9. a .
 10. $\frac{x+1}{x-1}$.
 11. $\frac{b(3a+b)}{(a+b)^2}$.
 12. $\frac{a-1}{2a}$.
 13. $-(x^2+y^2)$.
 14. $\frac{a-x}{8x^2}$.
 15. $\frac{1}{1-x}$.
 16. 1.
 17. $\frac{a+x-1}{a-x+1}$.
 18. $\frac{1+2y}{(x+y)(2x+1)}$.
 19. $\frac{y-x}{2y}$.
 20. 1.

Page 246

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|----------|----------|----------|-----------|-----------|
| 1. f . | 4. t . | 7. f . | 10. t . | 13. f . |
| 2. t . | 5. t . | 8. f . | 11. t . | 14. t . |
| 3. f . | 6. t . | 9. t . | 12. f . | 15. f . |

Page 248

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|------------------------------|------------------------|---|----------------------------|
| 1. 3. | 5. $2(2-m)$. | 9. $\frac{a-b}{a+b}$. | 13. $\frac{x^2+y^2}{2y}$. |
| 2. 2. | 6. $x-6$. | 10. $\frac{2}{x+1}$. | 14. $\frac{a}{a-2}$. |
| 3. 3. | 7. a . | 11. $\frac{a-x}{x}$! | 15. $\frac{x+y}{x-y}$. |
| 4. $\frac{1}{2(m+n)}$. | 8. $\frac{x+1}{x-1}$. | 12. x^2+1 . | 16. -1 . |
| 17. $\frac{x^3(x+2)}{x+4}$. | 18. $\frac{5}{16}$. | | |

Page 249

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|----------|-----------|-------------------------------|-----------------------------------|-----------------------------------|
| 1. f . | 6. f . | 11. f . | 16. f T | 21. f T |
| 2. f . | 7. t . | 12. f . | 17. f F | 22. t . |
| 3. t . | 8. f . | 13. t . | 18. f . | 23. t . |
| 4. t . | 9. f . | 14. f . | 19. f T | 24. t . |
| 5. f . | 10. t . | 15. t . | 20. f F | 25. f F |
| | | 26. f | | |

Page 249

1. $\frac{x+2}{x-4}$. 2. $Z, 491 \text{ lb.}; T, 982 \text{ lb.}; C, 3928 \text{ lb.}$

Page 250

3. $.16x^3 + .4x^2 + .44x + .3$.
4. $O \doteq W \cdot \text{ft.}; I = 33000 \text{ m} \cdot \text{h} \cdot \text{p}; E = \frac{O}{I}$.
5. 67.3% .
6. $60^\circ, 30^\circ$.
7. $\frac{2x-37}{x^2-9}$.
8. $a^2 + ab + b^2 + \frac{2b^3}{a-b}$.

Page 251

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|---|--|
| 9. 6, -4. | 16. 43. |
| 10. 12 ft. | 17. $a^2 + b^2$. |
| 11. \$63.96. | 18. $s = \frac{W}{f}$. |
| 12. 6, 12, 14. | 19. $c = 50¢ + 2 w¢$. |
| 13. 48000 qt.; 2400 x qt.; 2400 $(x-6)$ qt. | 20. W increases. |
| 14. No. | 22. Larger, smaller, smaller,
larger, larger, smaller,
the same. |
| 15. -3. | |

Page 254

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|--------|--------|---------|--------|
| 1. 12. | 3. 6. | 5. -14. | 7. -4. |
| 2. 36. | 4. 12. | 6. 80. | 8. 20. |

Page 255

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|---------|----------------------|---------------------|---------------------|
| 9. 5. | 11. 9. | 13. $\frac{1}{4}$. | 15. $\frac{1}{2}$. |
| 10. 30. | 12. $1\frac{1}{4}$. | 14. -15. | 16. 16. |

Page 256

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|--------|---------|---------|---------------------|--------|
| 1. 12. | 6. -3. | 11. 2. | 16. $\frac{1}{2}$. | 21. 3. |
| 2. 3. | 7. 5. | 12. 6. | 17. 5. | 22. 6. |
| 3. -5. | 8. 3. | 13. 10. | 18. -5. | 23. 6. |
| 4. 7. | 9. -2. | 14. 1. | 19. 20. | 24. 7. |
| 5. 5. | 10. 14. | 15. 3. | 20. 8. | |

Page 257

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|---------|----------|--------|-----------------------|--------|
| 25. 28. | 26. -13. | 27. 8. | 28. $-1\frac{1}{2}$. | 29. 4. |
| | 30. 21. | | 31. 3. | |

Page 257

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|--------|--------|---------|----------|----------|
| 1. 10. | 4. 56. | 7. 180. | 10. 264. | 13. 280. |
| 2. 28. | 5. 12. | 8. 400. | 11. 50. | 14. 300. |
| 3. 30. | 6. 72. | 9. 250. | 12. 120. | 15. 800. |
| | | 16. 210 | | |

Page 258

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|----------|----------|----------|-----------|
| 17. 240. | 18. 250. | 19. 200. | 20. 1080. |
|----------|----------|----------|-----------|

Page 259

1. 9.	5. 3.	9. 5.	13. 4.	17. 5.
2. 5.	6. -18.	10. -1.	14. -3.	18. -3.
3. 8.	7. -10.	11. 2.	15. 0.	
4. 2.	8. $\frac{10}{3}$.	12. 6.	16. $\frac{3}{5}$.	

Page 260

19. -9.	23. 33.	27. $\frac{5}{16}$.	31. $-\frac{1}{2}$.	35. 4.
20. 9.	24. 87.	28. $\frac{27}{6}$.	32. 2.4.	36. $\frac{3}{7}$.
21. -5.	25. -1.	29. -2.	33. 4.	
22. -3.	26. $-\frac{3}{5}$.	30. 9.	34. 3.	

Page 261

1. 1.	2. -5.	3. 1.	4. $\frac{5}{12}$.	5. 6.	6. $4\frac{2}{3}$.
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Page 262

1. 3.	3. 3.	5. -1.	7. 5.	9. $\frac{1}{7}$.
2. -2.	4. $\frac{8}{6}$.	6. 3.	8. 2.	10. -8.

Page 263

1. 4.	5. 7.	9. 4.	13. 22.86.	
2. 3.	6. 6.	10. -6.	14. 11.62.	17. .53.
3. 8.	7. 0.	11. -5.	15. 1.03.	
4. 3.	8. -100.	12. 10.	16. .90.	

Page 265

1. $\frac{b}{6}$.	8. $b + 3$.	15. $3c$.	22. $\frac{a}{6}$.
2. $\frac{c}{b}$.	9. $a - 6$.	16. $\frac{1}{b}$.	23. $\frac{c - d}{5}$.
3. $-\frac{b}{7}$.	10. $5a$.	17. $\frac{a}{c}$.	24. $\frac{3b}{2}$.
4. $-\frac{c}{9}$.	11. $\frac{b}{6}$.	18. $\frac{a}{b}$.	25. 2.
5. a .	12. $\frac{a}{b}$.	19. $\frac{1}{bc}$.	26. $-\frac{a}{b}$.
6. $9a^2$.	13. $\frac{1}{a}$.	20. $\frac{e}{n}$.	27. $\frac{6a + 7b}{2}$.
7. $2b$.	14. $3a$.	21. $\frac{mb}{a}$.	28. 2.

29. $9a$.

30. $-a$.

31. $\frac{a}{8}$.

32. $\frac{5c-6bc}{b}$

33. $-\frac{2d}{a}$.

34. $a + 2m$.

35. $a - b$.

36. 1 .

37. $15b$.

Page 266

38. $b - c$.

39. d .

40. $\frac{a}{3}$.

41. $\frac{ch}{bk}$.

42. $\frac{4b}{3}$.

43. $\frac{16b}{7}$.

44. $\frac{3b}{2}$.

45. ab .

46. hk .

47. $a + b$.

48. $H - K$.

49. $c + b$.

50. $d - a$.

51. $\frac{48c}{7}$.

52. $\frac{b-a}{3}$.

53. $\frac{hk-1}{km+n}$.

54. $\frac{2n}{a+c}$.

55. $\frac{abc}{ab+bc+ac}$.

56. $\frac{m}{n}$.

57. 0 .

Page 268

1. (a) $F = \frac{3}{5}C + 32$.

(b) 212°

(c) 32° .

(d) 0° .

2. (a) $a = \frac{2S}{t^2}$.

(b) 256.

(c) 1024.

(d) 4096.

3. (a) $n = \frac{2S}{a+l}$; $a = \frac{2S-nl}{n}$; $l = \frac{2S-na}{n}$.

(b) 165.

(c) 330.

(d) 495.

4. (a) $r = \frac{S-a}{S-l}$; $l = \frac{rS-S+a}{r}$; $a = S+rl-rS$.

(b) 252.

(c) 508.

5. (a) $l_1 = \frac{l_2 w_2}{w_1}$.

(b) 9.6.

(c) 4.8.

(d) 19.2.

Page 269

6. (a) $h = \frac{3V}{\pi r^2}$.
 (b) 3.27.
 (c) 13.08.
 (d) 26.16.
7. 37.71; 301.68; 1018.16.
8. 84.3; 674.6; 2276.1.
9. (a) $P_2 = \frac{V_1 P_1}{V_2} \cdot V_2 = \frac{V_1 P_1}{P_2}$.
 (b) 4. (c) 8. (d) 8.
10. (a) $h = \frac{2A}{b + b'}$.
 (b) 288. (c) 576. (d) 468.
11. $e = \frac{CR + Cnr}{n}$; $n = \frac{CR}{e - Cr}$.
 $R = \frac{en - Cnr}{C}$.
12. (a) $E = \frac{180A}{\pi r^2}$.
 (b) 160.9.
 (c) 321.8.
 (d) 1287.1.
13. Increased. Decreased. Yes.
 Yes.
14. Increased. Decreased. Yes.
 Yes
15. If n is increased, K is decreased.
 If n is decreased, K is increased.

Page 270

16. $c = \text{s.p.} - g$.
 $g = \text{s.p.} - c$.
17. $g = cr\%$.
 $c = \frac{g}{r\%}$.
18. $\text{m.p.} = \frac{\text{s.p.}}{1 - r\%}$.
19. $p = \frac{i}{rt}$; $r = \frac{i}{pt}$; $t = \frac{i}{pr}$.
20. $a = \frac{V}{bc}$; $b = \frac{V}{ac}$; $c = \frac{V}{ab}$.
21. $D = dq + R$.
22. $P = Mm$.
 $R + S = M$.

Matching

1. $A = lw$. 2. $A = bh$. 3. $A = \pi r^2$.

Page 271

4. $C = 2\pi r$. 8. $V = lwh$. 12. $V = \frac{4}{3}\pi r^3$.
5. $I = prt$. 9. $A = \frac{a}{2}(b + b')$. 13. $V = \frac{1}{3}\pi r^2 h$.
6. $s = 6e^2$. 10. $A = s^2$. 14. $h = \frac{2A}{b}$.
7. $V = e^3$. 11. $d = rt$. 15. $s = c + g$.

Selection

1. 72. 2. 40. 3. 36. 4. 24. 5. 7.

Page 272

6. 12. 7. A circle. 8. 5¢. 9. $2l + 2w$. 10. 20.

Page 273

1. $\frac{2}{3}(n + 3) = 21$. 4. $\frac{1}{4}n + 4n = 34$.
 2. $\frac{3}{4}n + 24 = 6$. 5. $\frac{1}{4}n - 3 = n - \frac{1}{8}n$.
 3. $n - 12 = \frac{1}{3}n$.

Page 273

1. 18. 2. 36. 3. 36. 4. \$6000, \$9000. 5. 56. 6. 72.

Page 274

7. 32, 12. 10. 25, 150. 13. 5. 16. $\frac{19}{17}$.
 8. 17, 434. 11. 16. 14. 1. 17. 37.
 9. 360, 90. 12. 24. 15. 10.

Page 275

18. 232. 19. $7\frac{5}{6}$. 20. 4. 21. $x - 7$.

Page 275

1. $\frac{d}{n}$. 3. $\frac{s}{5}$. 5. $\frac{d + e + f}{3}$.
 2. $\frac{m}{10}$. 4. $\frac{x + y + z}{3}$. 6. $\frac{2A + B + C}{4}$.

Page 275

1. 94. 2. 92.

Page 276

3. 84. 4. 4400 lbs.

Page 276

1. 30 ft. 2. 4 by 3 ft.

Page 277

3. 32 by 20 ft.

4. 18 by 12 rods.

Page 277

1. $\frac{r + 60}{2}$ ¢.

4. $\frac{y}{4}, \frac{y}{2}, \frac{y}{3}, \frac{5y}{4}, \frac{y}{100}$.

2. $\frac{4x}{5}$ dollars.

5. $\$ \frac{6d}{100}, \$ \frac{21d}{400}$.

3. $\$ \frac{d}{3}, \$ \frac{3d}{5}$.

Page 277

1. \$240.

2. \$800 @ 5%; \$1000 @ 6%.

3. \$15,000.

Page 278

4. \$20,000.

5. \$12,000.

6. 600.

Page 278

1. $n, 9; q, 18$.

2. $d, 16; q, 17$.

3. $q, 4; d, 7; n, 14$.

Page 278

1. $\frac{1}{3}, \frac{x}{3}$.

2. $\frac{1}{24}, \frac{1}{6}, \frac{1}{h}, \frac{1}{h+2}, \frac{1}{x-1}$.

Page 279

3. $3\frac{1}{18}$.

4. $2\frac{6}{11}$.

5. $4\frac{4}{5}$.

6. $2\frac{2}{9}$ hrs.

Page 280

7. $6\frac{2}{3}$.

8. $3\frac{1}{18}$.

9. $1\frac{2}{13}$.

10. $2\frac{14}{23}$.

Page 281

1. $\frac{m}{c}$.

3. $100 - x; 100 + x$.

5. $x + 10$.

2. $S + C; S - C$.

4. 88 m.

Page 282

6. $\frac{k}{m - s}$.

7. (a) $\frac{2r}{3};$ (b) $\frac{100}{r}$.

Page 282

1. 6. 2. 5. 3. 5.

Page 283

4. au , 40; ai , 80. 5. a , 42; b , 7. 6. 30, 36.

Page 284

7. 5. 8. 480 mi. 9. 15 mi. per hour.
10. 10 mi. 11. 20 mi. per hr.

Page 285

12. 28.1 mi. 13. 37.5 mi.

Page 285

4. 30 lb. @ 35¢. 5. 75 lb. @ 40¢. 6. 5.
20 lb. @ 60¢. 25 lb. @ 80¢.

Page 286

7. $2\frac{6}{7}$. 9. $1\frac{1}{12}$. 11. 15 13. g , 19.
8. 13. 10. $13\frac{1}{3}$. 12. 24. s , 21.

Page 287

14. $1\frac{2}{15}$. 15. 12. 16. .8 liter.

Page 288

1. 50 lb. 2. 60 lb. 3. $45\frac{5}{11}$ lbs. 4. 6 ft.

Page 289

1. 300 a . 4. \$84. 7. H , 8; s , 12.
2. \$140.40 5. \$6000. 8. 10.
3. 9 ft. 6 ft. 6. J , 24; f , 48. 9. f , 12 ft.; r , 15 ft.

Page 290

1. $\frac{x^2 - 5x + 6}{x + 4}$. 5. 36.
2. $\frac{x^3 - 2x^2 - 5x + 2}{x - 3}$. 6. It does.
3. $\frac{2x^3 + x^2 + 4x + 2}{x^2 - 4}$. 7. $(x + 2)(x - 2)(x - 3)$
4. (a) $x(5x + 3)(3x - 5)$. 8. $a - 3b$.
(b) $m^2(n + 3)(n + 6)$. 9. 5, 10, 20, 30.
5. $\frac{1}{a - 1}$. 10. $\frac{1}{a - 1}$.
11. False. $a^4 - 4ax + 4x^2$.

Page 291

12. $\frac{1}{a^2 - 1}$.
 13. $(x + 2)(2x - 3)$.
 14. $\frac{3k}{10}$.
 15. 48.
 16. $2(a - x)$.
 17. $3a, a^3$.
 18. $t, 1, 2, 4;$
 $d, 30, 60, 120$.
 19. $a^2 + ab$.
 20. Side in inches.
 $P = 48$ s.

Page 292

21. Monomial.
 22. $a^2 - 2ab + 4b^2$.
 23. a/b .
 24. Increased.
 25. $4a$.
 26. $3b^2 + 2ab - a^2$.
 27. $S = \frac{n}{2}(a + l)$.
 28. 94.
 29. $\frac{x + y}{x^2 - y^2} = \frac{1}{x - y}$.
 30. 8.

Page 297

2. Triangle. 6. 3. Rectangle. 24. 21. The y -axis.

Page 301

1. $x = 1$.
 $y = -1$.
 2. $x = -6$.
 $y = 0$.
 3. $x = 4$.
 $y = 3$.
 4. $x = -1$.
 $y = 2$.
 5. $x = 0$.
 $y = 4$.
 6. $x = 5$.
 $y = 2$.
 7. $x = 2$.
 $y = -\frac{3}{2}$.
 8. $x = \frac{1}{2}$.
 $y = -\frac{1}{2}$.
 9. $x = 0$.
 $y = 0$.
 10. $x = \frac{5}{4}$.
 $y = -\frac{5}{2}$.
 11. $x = 4$.
 $y = 2$.
 12. $x = 4$.
 $y = 2$.
 13. All the lines cross at the point $x = 2, y = 3$.
 14. The lines are parallel. Hence no common roots. They are inconsistent equations.

Page 303

1. $x = 5$.
 $y = 1$.
 2. $x = 4$.
 $y = -2$.
 3. $x = -3$.
 $y = 5$.
 4. $x = 1$.
 $y = 7$.
 5. $x = 13$.
 $y = 17$.
 6. $y = 6$.
 $z = \frac{3}{4}$.
 7. $x = \frac{1}{2}$.
 $y = \frac{1}{3}$.
 8. $x = -\frac{3}{2}$.
 $y = 2$.
 9. $x = -1$.
 $y = 0$.
 10. $x = 3$.
 $y = \frac{2}{3}$.
 11. $x = \frac{3}{4}$.
 $y = -\frac{1}{2}$.
 12. $x = -10$.
 $y = 8$.

Page 304

13. $x = -6.$

$y = 2.$

14. $x = 5.$

$y = -3.$

15. $x = 7.$

$y = -2.$

16. $H = 18.$

$K = 4.$

17. $x = \frac{1}{2}.$

$y = 6.$

18. $x = 14.$

$y = 14.$

19. $x = 11\frac{1}{2}.$

$y = 1.$

Page 307

1. $x = 4.$

$y = -1.$

2. $x = 3.$

$y = 5.$

3. $x = -8.$

$y = 5.$

4. $x = 3.$

$y = -5.$

5. $x = \frac{1}{2}.$

$y = 4.$

6. $x = -5.$

$y = \frac{2}{3}.$

Page 308

7. $x = -4.$

$y = \frac{5}{4}.$

8. $x = 2.$

$y = -1.$

9. $x = 9.$

$y = 5.$

10. $H = 7.$

$K = 4.$

11. $x = 4.$

$y = 3.$

12. $x = \frac{1}{2}\frac{9}{1}.$

$y = \frac{1}{4}\frac{9}{4}.$

13. $x = 4.$

$y = 5.$

14. $x = 1.$

$y = -1.$

15. $x = \frac{1}{3}.$

$y = -\frac{1}{4}.$

16. $m = 3.$

$n = 4.$

17. $s = 3.$

$t = -7.$

18. $x = -2.$

$y = \frac{1}{2}.$

19. $x = 2.$

$y = 4\frac{1}{2}.$

20. $x = 2.$

$y = 6.$

Page 308

1. $x = 6.$

$y = 1.$

2. $x = 0.$

$y = -3.$

3. $x = -1.$

$y = -1.$

4. $x = 1.$

$y = 1.$

5. $x = 1.$

$y = 10.$

Page 309

1. $x = 6.$

$y = 4.$

2. $x = 10.$

$y = -6.$

3. $x = 20.$

$y = 7.$

4. $x = 60.$

$y = 75.$

5. $x = -8.$

$y = 4.$

6. $x = 0.$

$y = -12.$

10. $x = 2.32+.$

$y = -.858.$

7. $x = \frac{1}{2}.$

$y = \frac{3}{4}.$

8. $x = 3.5.$

$y = 4.5.$

9. $x = \frac{2}{3}.$

$y = 1.$

Page 309

- | | |
|--------------|--------------------|
| 1. $x = 20.$ | 3. $x = 3.$ |
| $y = 21.$ | $y = 5.$ |
| 2. $x = 51.$ | 4. $x = 4.$ |
| $y = 17.$ | $y = \frac{2}{5}.$ |

Page 310

- | | | |
|-----------------------|-------------------------|---------------|
| 5. $x = 6.$ | 8. $x = 8.$ | 11. $x = -1.$ |
| $y = 8.$ | $y = 9.$ | $y = 3.$ |
| 6. $x = 5.$ | 9. $x = 4.$ | 12. $m = 8.$ |
| $y = 4.$ | $y = -5.$ | $n = 9.$ |
| 7. $x = \frac{1}{5}.$ | 10. $m = -\frac{1}{2}.$ | 13. $x = 4.$ |
| $y = 6.$ | $n = 0.$ | $y = 6.$ |
| | 14. $x = \frac{1}{2}.$ | |
| | $y = \frac{1}{4}.$ | |

Page 311

- | | | |
|------------------------|-----------------------|-----------------------|
| 1. $x = 2.$ | 4. $x = \frac{1}{5}.$ | 7. $x = 7.$ |
| $y = 4.$ | $y = \frac{1}{3}.$ | $y = 1.$ |
| 2. $x = 3\frac{1}{5}.$ | 5. $x = 2.$ | 8. $x = \frac{2}{3}.$ |
| $y = 16.$ | $y = -\frac{10}{3}.$ | $y = \frac{1}{2}.$ |
| 3. $x = \frac{3}{8}.$ | 6. $x = -9.$ | |
| $y = \frac{3}{4}.$ | $y = 7.$ | |

Page 312

- | | |
|-----------------------|----------------------------|
| 9. $x = \frac{1}{2}.$ | 11. $J, 15; B, 30.$ |
| $y = -\frac{2}{3}.$ | 12. First, 8 hr. |
| 10. $x = 2.$ | Second, $5\frac{1}{2}$ hr. |
| $y = -5.$ | |

Page 313

- | | |
|----------------------------|---------------------------|
| 1. $x = 3b.$ | 4. $x = 0.$ |
| $y = -b.$ | $y = 3.$ |
| 2. $x = 2m.$ | 5. $x = \frac{a + 5b}{5}$ |
| $y = 0.$ | $y = \frac{5b - a}{5}$ |
| 3. $x = \frac{n - 6}{5l}.$ | 6. $x = \frac{a}{2}$ |
| $y = \frac{2n + 3}{5m}.$ | $y = \frac{3a}{2}.$ |

$$7. x = \frac{dk + bl}{da + bc}.$$

$$y = \frac{ck - al}{cb + ad}.$$

$$8. x = a - b.$$

$$y = a - b.$$

$$9. x = \frac{c^2q^2 - b^2r^2}{a^2q^2 - b^2p^2}.$$

$$y = \frac{c^2p^2 - a^2r^2}{b^2p^2 - a^2q^2}.$$

$$10. x = \frac{ad - bc}{d - 2b}.$$

$$y = \frac{cb - ad}{c - 2a}.$$

$$11. x = \frac{2}{r + s}.$$

$$y = \frac{2}{s - r}.$$

$$12. x = \frac{ab - 1}{(1 - a)(1 - b)}.$$

$$y = \frac{a - b}{(1 - a)(1 - b)}.$$

$$13. x = 0$$

$$y = 0.$$

$$14. x = \frac{a(k + l)}{2}.$$

$$y = \frac{b(k - l)}{2}.$$

$$15. x = 0.$$

$$y = 5h.$$

Page 314

$$16. S = \frac{Ft^2}{2M}.$$

$$17. v = \frac{2s}{t}; s = \frac{1}{2}vt.$$

Page 314

$$1. x + y = 10.$$

$$2. x - y = 4.$$

$$3. x = y + 6.$$

$$4. x^2 + y^2 = 25.$$

$$5. x^2 - y^2 = 64.$$

$$6. xy = 72.$$

$$7. x/y = 3.$$

$$8. 5x - y = 19.$$

$$9. 8x - 6y = 16.$$

$$10. y/x = \frac{1}{2}.$$

$$11. 5n + 10d = 75.$$

$$12. \frac{y + 12}{x} = \frac{x}{y}.$$

$$13. .06d = x.$$

Page 315

$$14. .04d = y.$$

$$15. \frac{y}{x + 6} = \frac{1}{3}.$$

$$16. \frac{x}{y} = 10 + \frac{2}{y}.$$

$$17. 2x + 2y.$$

$$18. xy.$$

$$19. (a) \text{ Decreased.}$$

$$(b) \text{ Increased.}$$

$$20. 6xy = 480.$$

$$21. \text{Jo, } \frac{1}{3}; \text{Ji, } \frac{1}{6}.$$

$$22. \text{The part both can do in 1 day.}$$

$$23. \frac{x - y}{\frac{1}{2}(x + y)} = \frac{1}{6}.$$

$$24. n = 10t + u.$$

$$25. x^2 + y^2 - 75 = 25.$$

$$26. 2(3l + 3w) = 108.$$

$$27. 2(2l + 4w) = 80.$$

Page 316

28. $4x + b = 48.$

29. $\frac{100}{x} + \frac{100}{y}.$

30. $\frac{1}{x} + \frac{1}{y}.$

Page 317

1. 86, 28.

5. 30, 12.

9. 480, 120.

2. 25, 8.

6. 132, 22.

10. $\frac{a+b}{2}, \frac{a-b}{2}.$

3. 896, 304.

7. 30, 12.

11. $A, n + \frac{1}{2}d; B, \frac{1}{2}d - n.$

4. 112, 28.

8. 28, 15.

Page 317

1. $700 + 60 + 8.$

3. $100h + 10t + u. \quad htu.$

2. $10t + u.$

$h + t + u. \quad 100u + 10t + h.$

4. 82.

Page 318

5. 75.

7. 48.

9. 46.

11. 28.

6. 47.

8. 96.

10. 872.

12. 36.

Page 319

1. 204, 17.

6. $\frac{1}{18}.$

10. $\frac{100d + c}{2}$ cents;

2. 27, 40.

7. $\frac{1}{10}.$

$\frac{100d - c}{2}$ cents.

3. 12, 18.

8. $\frac{1}{2}, \frac{1}{3}.$

4. 6, 10.

9. $\frac{m}{n+1}, \frac{mn}{n+1}.$

5. $\frac{2}{4}.$

11. $A, \frac{9c + 7d}{2}$ dollars; $B, \frac{3c + 7d}{4}$ dollars.

Page 320

1. $d, 9; n, 28.$

3. 30, 1¢; 50, 2¢.

2. $d, 7; q, 15.$

4. 100, 1¢; 20, 2¢; 10, 5¢.

Page 320

1. \$7175; \$7825.

3. $au, \$3000; ai, \$12,000.$

2. $a, 100; c, 50.$

4. $h, \$13; s, \$6.$

5. \$600, \$3000.

Page 321

6. $co, 8; ca, 5.$

8. $W, \$3600; J, \$4800.$

7. $co, 3¢; cu, 4¢.$

9. $A, \$6000; B, \$10,000.$

Page 322

1. b , \$6200; m , 2400.
2. \$3500 @ $4\frac{1}{2}\%$; \$1500 @ $5\frac{1}{2}\%$.
3. \$5000 @ 6% ; \$9000 @ 5% .
4. \$20,000.

Page 322

1. c , 28¢; t , 42¢.
2. 8 lb. @ 50¢; 16 lb. @ 65¢.
3. 33 lb. @ 36¢; 17 lb. @ 22¢.
4. 30 lb. @ 15¢; 20 lb. @ 20¢.
5. 36 lb. @ 30¢; 54 lb. @ 80¢.

Page 323

6. c , 21 qt.; m , 15 qt.
7. m , 16 qt.; c , 24 qt.

Page 323

1. c , 1 mi. per hr.
 r , 3 mi. per hr.
2. s , $12\frac{1}{2}$ mi. per hr.
 c , $2\frac{1}{2}$ mi. per hr.
3. b , 70; w , 80.
4. 10 yds. per sec.

Page 324

5. $5\frac{1}{2}$ mi. per hr.
2 mi. per hr.
6. a , 100 mi.
 w , 20 mi.

Page 324

1. 24 by 16 yds.
2. 90 by 60 feet.
3. 20° , 70° .
4. $a = 3$, $b = \frac{1}{5}$, $P = 11$.
5. M , 21; J , 9.
6. H , 10; F , 18.

Page 325

7. A , 6 da.; B , 8 da.
8. J , 18 da.; F , 6 da.
9. 3, 7.
10. 55° , 18° .
11. $\frac{3m - 4n}{2}$ cts.; $3n - 2m$ cts.

Page 327

1. 7 hrs.
2. $4\frac{4}{9}$ miles.

Page 328

3. $21\frac{2}{3}$ mi. an hr.
4. $3\frac{1}{2}$ hrs. $1\frac{1}{2}$ hrs.
5. 30 mi.
6. $2\frac{6}{7}$ da.
7. $6\frac{2}{3}$ da.
8. $1\frac{3}{4}$ hrs.
9. 6 times and 5 times respectively.

Page 329

10. $2\frac{3}{8}$ hrs.

Page 329

1. t .2. f .3. f .4. t .5. f .

Page 330

6. f .7. f .8. t .

Page 330

1. (a) 2601. (b) 899.

2. $8\frac{8}{15}$.

Page 331

3. 76.

5. $M = \frac{F}{a}$.

6. $s = \frac{aC}{360}$; $a = \frac{360 s}{C}$.

7. $\frac{x^2 - y^2}{2}$.

8. $\frac{s+d}{2}$, $\frac{s-d}{2}$.

13. f . 1.

9. $x = \frac{ab - b}{a - 2}$, $y = \frac{b}{a - 2}$.

10. $S = \frac{100 c}{100 - p - b}$.

11. $c = \frac{100 S - pS - bS}{100}$.

12. $\frac{c}{d}\%$, $\frac{c}{d + \frac{c}{100}}\%$.

14. f . $x + \frac{1}{5}$.

Page 332

15. t .

16. f . $x^2 - 4x + 4$.

17. t .18. f . 8.

19. f . $2x + 3y$.

20. f . 0.

21. f . $4x^2$.

22. t .

23. f . $4x + 3x = 12$.

24. f . $\frac{7}{12}$.

25. f . $(x + 3)(3x - 2)$.

26. t .27. t .28. f . 11.29. t .

30. f . $10xy$.

31. f . $\frac{x+k}{y+k}$.

32. t .

33. (a) $(4x)^2 + (5y)^2$.

(b) $(4x)^2 - (5y)^2$.

(c) $(4x + 5y)^2$.

34. $d = 1130 t$.

35. $t = 90 + 30 n$.

Page 338

 \pm before each of the following inclosed in a parenthesis.

1. $x + 3$.

7. $10m - 2n$.

13. $4x + \frac{1}{x}$.

2. $x - 6$.

8. $6x + y$.

14. $a + \frac{2}{b}$.

3. $x - 4y$.

9. $x - 7z$.

15. $.2x + .3y$.

4. $2x - 3y$.

10. $4x - 2$.

5. $5x - 1$.

11. $s - 10$.

6. $5a + 3b$.

12. $9 + 3x$.

Page 339

1. 86. 2. 123. 3. 428. 4. 902.

Page 340

- | | | | |
|-----------|------------|------------|----------------|
| 6. 1.8. | 12. 544.2. | 18. 2.9. | 24. 4.73. |
| 7. 21.4. | 13. 5.0. | 19. 3.6. | 25. 4.25. |
| 8. 4.1. | 14. 16.9. | 20. 19.85. | 26. (a) 1.732. |
| 9. .6. | 15. .6. | 21. 4.09. | (b) 1.414. |
| 10. 1.3. | 16. .6. | 22. 34.56. | 27. 35.8 rods. |
| 11. 65.5. | 17. 1.9. | 23. .67. | |

Page 342

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|----------|-----------|-------------|
| 1. 4.36. | 6. 8.37. | 11. 4.58. |
| 2. 6.24. | 7. 3.87. | 12. 6.78. |
| 3. 9.85. | 8. 7.55. | 13. .56. |
| 4. 2.83. | 9. 5.66. | 14. 2.071. |
| 5. 8.19. | 10. 7.42. | 15. 10.828. |

Page 343

- | | |
|--------------------------------|----------------|
| 1. 7.6 by 5.3 in. 40.3 sq. in. | |
| 2. (a) 168., 168.1, 168.09. | 3. (a) 2679.8. |
| (b) 82., 82.0, 81.96. | (b) 325.2. |
| (c) 6, 6.5, 6.46. | (c) 640.2. |
| (d) 12., 11.9, 11.93. | (d) 1701.1. |
| (e) 1, .8, .76. | (e) 343.3. |
| (f) 3, 2.5, 2.53. | (f) 5255.1. |

Page 344

6. (a) 1513. (b) 5525. (c) 1052. (d) 10339.

Page 345

1. 9.4. 2. 9.2. 3. 30.2. 4. 26.9. 5. 2.7. 6. .7.

Page 345

- | | | | |
|-----------|----------|-------------------|------------------|
| 1. Equal. | 3. Time. | 5. One; | 7. Substituting; |
| 2. Minus. | 4. Two. | negative. | root; |
| | | 6. Multiplication | original. |

Page 346

8. Subtracting; sign. 9. -7 ; 7 . 10. Greater.

Page 347

1. 10. Hypotenuse. 3. $b^2 = c^2 - a^2$.
 2. $a^2 = c^2 - b^2$. $b = \sqrt{c^2 - a^2}$. 4.
 $a = \sqrt{c^2 - b^2}$. 3. 4. 21.04 ft.

Page 348

5. 149.9 ft. 9. $h = 49.39$ ft. 12. $a = 2.88$ in.
 6. 3.46 in. $A = 546$ sq. ft. $d = 5.77$ in.
 7. 2.828 in. 10. $b = 17.46$ ft. $A = 14.43$ sq. in.
 8. 127.27 ft. $A = 244.44$ sq. ft. 13. 19.654 .
 11. 71.02 ft.

Page 349

14. 188.9 ft. per sec. 17. 9 and 12.
 15. 24.5 in. 18. 6, 8 and 10.
 16. 31.6 ft. 19. 2 and 5 ft.

Page 351

1. $4\sqrt{2}$. 3. $9\sqrt{x}$. 5. $3\sqrt{10}$.
 2. $20\sqrt{3}$. 4. $-18\sqrt{6}$. 6. $-12a\sqrt{x}$.
 7. $-2\sqrt[4]{2}$. 9. $(a + c - m)\sqrt{b}$.
 8. $(a + 2b + 3c - 4d)\sqrt[3]{6}$. 10. $(a + 3b + 20c - 8)\sqrt[3]{5}$.

Page 352

1. $2\sqrt{2}$, $-9\sqrt{5}$, $9\sqrt{7}$, $9\sqrt[3]{2}$. 2. $-2\sqrt{6} - 4\sqrt{5} + 4\sqrt{2}$.
 $10\sqrt{3}$, $-3\sqrt{10}$, $8\sqrt{7}$, $(a-c)\sqrt{5}$. 3. $4\sqrt{2} - 13\sqrt{3} + 7\sqrt{7}$.
 $6\sqrt{6}$, $\sqrt{3}$, $11\sqrt{3}$, $(5a - 6b)\sqrt[3]{2}$.

Page 353

4. $\sqrt[3]{2} + 4\sqrt[3]{10}$. 7. $\sqrt{x} - 2\sqrt{y} + \sqrt{z}$.
 5. $7\sqrt{a} - 21\sqrt{b} - 7\sqrt{c}$. 8. $6\sqrt[3]{a} + 25\sqrt[3]{b} + 24\sqrt[3]{c}$.
 6. $5\sqrt{6} - 11\sqrt{5} + 9$.

Page 354

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|--------------------|-----------------------|------------------------------|--------------------------------|
| 1. $4\sqrt{2}$. | 12. $21\sqrt{7}$. | 23. $\frac{20}{3}\sqrt{2}$. | 34. $2\sqrt[4]{2}$. |
| 2. $2\sqrt{2}$. | 13. $6\sqrt{7}$. | 24. $a\sqrt{3}$. | 35. $3\sqrt[4]{2}$. |
| 3. $6\sqrt{2}$. | 14. $33\sqrt{3}$. | 25. $\sqrt{7}c$. | 36. $-4\sqrt[3]{3}$. |
| 4. $5\sqrt{2}$. | 15. $-8\sqrt{2}$. | 26. $3c^2\sqrt{x}$. | 37. $6\sqrt[3]{2}$. |
| 5. $9\sqrt{2}$. | 16. $-4\sqrt{10}$. | 27. $2\sqrt{yz}$. | 38. $6\sqrt[4]{4}$. |
| 6. $10\sqrt{2}$. | 17. $a\sqrt{3}$. | 28. $a^2x\sqrt{x}$. | 39. $6\sqrt[5]{2}$. |
| 7. $-9\sqrt{2}$. | 18. $3ab^2\sqrt{b}$. | 29. $6x^3y\sqrt{yz}$. | 40. $4\sqrt[3]{9}$. |
| 8. $6\sqrt{2}$. | 19. $-2b^2\sqrt{2}$. | 30. $3\sqrt[3]{3}$. | 41. $5a\sqrt[3]{9}$. |
| 9. $12\sqrt{5}$. | 20. $30\sqrt{10}a$. | 31. $3\sqrt[3]{2}$. | 42. $6a^2b\sqrt[3]{2b}$. |
| 10. $20\sqrt{2}$. | 21. $-6a\sqrt{2}$. | 32. $3\sqrt[3]{6}$. | 43. $\frac{3}{2}\sqrt[3]{2}$. |
| 11. $6\sqrt{5}$. | 22. $2\sqrt{3}$. | 33. $2\sqrt[3]{2}$. | 44. $xy\sqrt[3]{y}$. |

Page 355

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|------------------------------|------------------------------|-------------------------------|---------------------------------|
| 1. $\frac{1}{5}\sqrt{5}$. | 6. $\frac{1}{n}\sqrt{n}$. | 10. $\frac{5}{2}$. | 14. $\frac{1}{10}\sqrt{30}a$. |
| 2. $\frac{1}{2}\sqrt{2}$. | 7. $\sqrt{2}$. | 11. $\frac{1}{10}\sqrt{15}$. | 15. $\frac{1}{5y}\sqrt{10xy}$. |
| 3. $\frac{1}{3}\sqrt{3}$. | 8. $\frac{2}{3}\sqrt{6}$. | 12. $-\frac{2}{3}\sqrt{15}$. | 16. $\frac{ax^2}{5}\sqrt{30}$. |
| 4. $\frac{1}{3}\sqrt{6}$. | 9. $\frac{2}{3}\sqrt{6}$. | 13. $\frac{a}{6}\sqrt{6}$. | 17. $\frac{1}{3}\sqrt{15}$. |
| 5. $-\frac{1}{7}\sqrt{35}$. | 17. $\frac{1}{3}\sqrt{15}$. | 18. $2\sqrt{14}$. | |

Page 356

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|--------------------------------|-----------------------------------|---------------------------------|------------------------------|
| 19. $-\frac{1}{5}\sqrt{85}$. | 22. $\frac{a}{6b^2}\sqrt{30ab}$. | 25. $-4\sqrt[3]{2}$. | 29. $\frac{a}{2}\sqrt{13}$. |
| 20. $\frac{1}{a}\sqrt{2a}$. | 23. $\frac{1}{3ab}\sqrt{3b}$. | 26. $\frac{1}{5}\sqrt[3]{25}$. | 30. $\frac{a}{2}\sqrt{5}$. |
| 21. $\frac{1}{b^2}\sqrt{3b}$. | 24. $\frac{1}{a}\sqrt{a+a^3}$. | 27. $\frac{1}{3}\sqrt{10}$. | |
| | | 28. $\frac{1}{2}\sqrt{7}$. | |

Page 356

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|--------------------|--------------------|-----------------------------|--------------------|
| 1. $-4\sqrt{3}$. | 3. $29\sqrt{5}$. | 5. $\frac{26}{5}\sqrt{5}$. | 7. $4x\sqrt{y}$. |
| 2. $-18\sqrt{2}$. | 4. $-37\sqrt{a}$. | 6. $3a^2\sqrt{2ab}$. | 8. $-23\sqrt{3}$. |

Page 357

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|-------------------------------|--|--|
| 9. $\frac{397}{30}\sqrt{2}$. | 12. $-2\sqrt{5}$. | 15. $16\sqrt[3]{2}$. |
| 10. $(2a-9b+5ab)\sqrt{7ab}$. | 13. $\frac{14}{5}\sqrt{2}+\frac{51}{5}\sqrt{15}$. | 16. $4a\sqrt[3]{2}$. |
| 11. $\sqrt{2a}$. | 14. $\frac{4}{3}\sqrt{3}-\frac{1}{3}\sqrt{6}$. | 17. $\sqrt[3]{25}+\frac{2}{3}\sqrt[3]{75}$. |

Page 357

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|-------------------|-------------------|--------------------|
| 1. $2\sqrt{6}$. | 3. $6\sqrt{14}$. | 5. $16\sqrt{10}$. |
| 2. $5\sqrt{15}$. | 4. $6\sqrt{15}$. | 6. $12\sqrt{3}$. |

Page 358

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|---------------------|------------------------------|----------------------|-------------------------|
| 7. $30\sqrt{6}$. | 14. $-15b\sqrt{2}$. | 19. $ab^2\sqrt{b}$. | 25. 27. |
| 8. $20\sqrt{30}$. | 15. $\frac{1}{c}\sqrt{ac}$. | 20. 8. | 26. $-10\sqrt[3]{12}$. |
| 9. $-24\sqrt{6}$. | | 21. 45. | 27. $30\sqrt[3]{4}$. |
| 10. $-80\sqrt{6}$. | 16. 90. | 22. 48. | 28. $ab\sqrt[3]{xy}$. |
| 11. $40\sqrt{15}$. | 17. -30 . | 23. 150. | 29. 20. |
| 12. 42. | 18. 280. | 24. 20. | 30. 90. |
| 13. $60a$. | | | |

Selection Test

- | | | | | |
|------------|------------|------------|------------------|-------------|
| 1. a^7 . | 3. x^8 . | 5. 5^5 . | 7. \sqrt{ab} . | 9. -9 . |
| 2. 3^7 . | 4. a^5 . | 6. a^8 . | 8. $3\sqrt{2}$. | 10. x^3 . |

Page 359

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|-------------------|----------------------|-------------------------------|-------------------------------|
| 1. $\sqrt{20}$. | 6. $\sqrt{2a^2}$. | 11. $\sqrt[3]{128}$. | 16. $\sqrt{5}$. |
| 2. $\sqrt{18}$. | 7. $\sqrt{4a^3}$. | 12. $\sqrt[3]{-48}$. | 17. $\sqrt{12}$. |
| 3. $\sqrt{32}$. | 8. $\sqrt{18x}$. | 13. $\sqrt{a^3x^3}$. | 18. $\sqrt[5]{4}$. |
| 4. $\sqrt{150}$. | 9. $\sqrt[3]{48}$. | 14. $\sqrt{x^5}$. | 19. $\sqrt[3]{\frac{3}{4}}$. |
| 5. $\sqrt{27}$. | 10. $\sqrt[3]{54}$. | 15. $\sqrt[3]{\frac{3}{2}}$. | 20. $\sqrt{\frac{4}{3}}$. |

Page 360

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|------------------|--------------------|--------------------|------------------|
| 1. $\sqrt{5}$. | 4. $\sqrt{11}$. | 7. $\sqrt[3]{5}$. | 10. $\sqrt{3}$. |
| 2. $\sqrt{7}$. | 5. $\sqrt[3]{3}$. | 8. $\sqrt[3]{7}$. | 11. $\sqrt{5}$. |
| 3. $\sqrt{10}$. | 6. $\sqrt[3]{2}$. | 9. $\sqrt{2}$. | 12. $\sqrt{6}$. |

Page 361

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|------------------------------------|---------------------------------|----------------------------|
| 1. $2\sqrt{6} - 3$. | 7. $3a + 3\sqrt{ab}$. | 13. $-21\sqrt{2}$. |
| 2. $24 - 3\sqrt{2}$. | 8. $-2a\sqrt{b} + 2b\sqrt{a}$. | 14. $74 + 43\sqrt{2}$. |
| 3. $30 - 15\sqrt{6}$. | 9. 7. | 15. $-44 - 10\sqrt{10}$. |
| 4. $5\sqrt{15} + 15$. | 10. 15. | 16. $4 - 8\sqrt{x} + 4x$. |
| 5. $18\sqrt{2} - 24$. | 11. 145. | 17. $a - b$. |
| 6. $-6\sqrt{2} - 9 + 15\sqrt{6}$. | 12. -41 . | |

$$18. 2a\sqrt{a} + ab - 4\sqrt{ab} - 2b\sqrt{b}.$$

$$19. 6x + \sqrt{xy} - 15y.$$

$$20. 4 - 12\sqrt{x} + 9x.$$

Page 362

- | | | |
|---------------------------|----------------------------|----------------------------|
| 1. $\frac{\sqrt{2}}{4}$. | 2. $\frac{2\sqrt{6}}{3}$. | 3. $\frac{5\sqrt{3}}{2}$. |
|---------------------------|----------------------------|----------------------------|

Page 363

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|-----------------------------|-------------------------------|--------------------------------|--------------------------------|
| 4. $-3\sqrt{2}$. | 9. $-2\sqrt{3}$. | 14. $\frac{3}{4}$. | 19. $\frac{5\sqrt[3]{9}}{3}$. |
| 5. $-\frac{3\sqrt{2}}{2}$. | 10. $\frac{5\sqrt{5}}{8}$. | 15. $\frac{3\sqrt{5}}{2}$. | |
| 6. $\frac{2}{3}$. | 11. $\sqrt{6}$. | 16. $-\sqrt{7}$. | 20. $\frac{2\sqrt[3]{9}}{9}$. |
| 7. $\frac{7\sqrt{6}}{9}$. | 12. $\frac{11\sqrt{15}}{5}$. | 17. $\sqrt{15}$. | |
| 8. $\frac{5\sqrt{2}}{3}$. | 13. $\frac{2\sqrt{6}}{9}$. | 18. $\frac{3\sqrt[3]{4}}{2}$. | |

Page 364

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|----------------------------|------------------------------|-----------------------------|-------------------------------|
| 1. $6\sqrt{6}$. | 7. $\sqrt{6}$. | 13. 10. | 19. $\frac{\sqrt{3}}{3}$. |
| 2. $-10\sqrt{15}$. | 8. $\frac{a}{b}\sqrt{b}$. | 14. 5. | 20. $\frac{3\sqrt{30}}{10}$. |
| 3. $a\sqrt{3}$. | 9. $\frac{1}{2}\sqrt{10}$. | 15. $\frac{3}{2}\sqrt{3}$. | 21. $\sqrt{3}$. |
| 4. $2ab\sqrt{30b}$. | 10. $\frac{1}{3}\sqrt{33}$. | 16. $2\sqrt{10}$. | 22. $\sqrt[3]{5}$. |
| 5. $\frac{1}{4}\sqrt{6}$. | 11. 3. | 17. $\frac{3}{8}\sqrt{5}$. | |
| 6. $\sqrt{2}$. | 12. 5. | 18. $\frac{3}{2}\sqrt{2}$. | |

Page 364

- | | | | |
|------------------------|---------------------------------------|------------------------|------------------------|
| 1. $3^{\frac{1}{2}}$. | 3. $a^{\frac{2}{3}}$. | 5. $x^{\frac{1}{4}}$. | 7. $x^{\frac{1}{2}}$. |
| 2. $x^{\frac{1}{3}}$. | 4. $a^{\frac{1}{3}}x^{\frac{1}{3}}$. | 6. $m^{\frac{2}{3}}$. | 8. $x^{\frac{1}{4}}$. |

Page 365

- | | | | |
|--------------------------|------------------------|------------------------|---------------------|
| 9. $\sqrt[3]{a^2}$. | 14. $3\sqrt[3]{x^2}$. | 19. $m\sqrt{m}$. | 24. -2 . |
| 10. $\sqrt[4]{27}$. | 15. $2\sqrt[4]{m}$. | 20. $ax\sqrt[4]{ax}$. | 25. 4. |
| 11. $\sqrt{2}$. | 16. $3\sqrt{2}$. | 21. 4. | 26. $\frac{1}{2}$. |
| 12. $x\sqrt{x}$. | 17. $3\sqrt{3}$. | 22. 32. | |
| 13. $\sqrt[5]{a^4y^4}$. | 18. $2\sqrt[3]{2}$. | 23. 2. | |

Review

- | | | |
|------------------|--|----------|
| 1. 6. | 3. By axioms of addition or subtraction. $x = \frac{1}{2}$. | |
| 2. $6\sqrt{6}$. | 4. $\frac{10a}{a+5}$. | 5. 5.76. |

Page 366

- | | | | |
|-----------|------------------------------|-------------------------|----------------------|
| 6. 0. | 8. 5. | 10. $1\frac{3}{8}$ qts. | 13. $2y\sqrt{x+y}$. |
| 7. 12 ft. | 9. $\frac{3a}{4}\sqrt{2a}$. | 12. $4\frac{1}{4}$. | |

14. $E = CR + Cr.$

$$R = \frac{E - Cr}{C}.$$

$$r = \frac{E - CR}{C}.$$

15. (a) $-$, (b) $+$, (c) $+$.

16. $x = -5.$

17. Yes.

18. $(5x - 7)(2x + 1).$

Page 367

19. $-2.$

Page 367

1. $3\sqrt{3}.$

2. $2.77.$

3. $6\sqrt{2}.$

4. $s\sqrt{2}.$

5. $8\sqrt{2}, 10\sqrt{2},$
 $15\sqrt{2}, 20\sqrt{2}.$

6. $\frac{d}{2}\sqrt{2}.$

7. $5.$

8. $4\sqrt{2}$ or $5.656.$

9. (b) $3\sqrt{3}.$

10. $\frac{2a}{3}\sqrt{3}.$

11. $18\sqrt{3}.$

12. 900π or $2827.44.$

Page 368

13. $5\sqrt{2}, 25.$

14. $10\sqrt{2}, 5\sqrt{6}.$

15. $16\sqrt{3}.$

16. 400π or 1256.64 sq. in.

17. $10\sqrt{17}$ or 41.23 ft.

18. $44.11.$

Page 369

1. (a) $V = \sqrt{\frac{2K}{m}} \text{ or } \frac{\sqrt{2Km}}{m}.$

(b) $3.65.$ (c) $2.58.$

(d) $2.58.$ (e) $3.65.$

2. (a) $t = \frac{\sqrt{2gs}}{g} \text{ or } \sqrt{\frac{2s}{g}}.$

(b) $3.1.$ (c) $1.77.$

(d) $4.33.$

3. (a) $\frac{\sqrt{\pi A}}{\pi} \text{ or } \sqrt{\frac{A}{\pi}}.$

(b) $7.$ (c) $4.95.$ (d) $9.90.$

4. (a) $r = \frac{\sqrt{\pi S}}{2\pi} \text{ or } \sqrt{\frac{S}{4\pi}}.$

(b) $4.4.$ (c) $3.1.$ (d) $6.2.$

5. $r = \frac{\sqrt[3]{6\pi^2 V}}{2\pi} \text{ or } \sqrt[3]{\frac{3V}{4\pi}}.$

6. (a) $\frac{\sqrt{\pi h V}}{\pi h} \text{ or } \sqrt{\frac{V}{\pi h}}.$

(b) $2.52.$ (c) $3.55.$

(d) $1.77.$ (e) $3.57.$

7. (a) $b = \sqrt{c^2 - a^2}.$

(b) $15.$ (c) $30.$ (d) $45.$

Page 370

8. (a) $b = \sqrt{ac}.$ (d) $4.24.$

(b) $6.$ (e) $8.48.$

(c) $8.48.$ (f) $12.$

9. (a) $s = \frac{d}{2}\sqrt{2}.$ (c) $3.$

(b) $6.$ (d) $12.$

10. (a) $18.$ (c) $18.$

(b) $39.24.$ (d) $72.$

11. (b) $21.33.$ (d) $5.33.$ (f) $43.3.$

(c) $17.89.$ (e) $85.32.$

Page 371

12. 6.59 sec.

13. 17.32 mi., 24.5 mi., 12.25 mi.

Page 372

14. 21.264, 15.04, 30.08.

15. (a) $d = \frac{2}{\pi} \sqrt{\pi A}$ or $\sqrt{\frac{4A}{\pi}}$.
 (b) $4\sqrt{2}$. (c) 4. (d) 8.

True-False

1. *t*.3. *f*.5. *f*.7. *t*.9. *f*.2. *f*.4. *f*.6. *t*.8. *f*.10. *t*.

Page 373

1. $-x - 7y + 12z^2$.

2. 8.

3. $\frac{a-6}{a^2-9}$.4. $10\sqrt{6}$.

5. (a) $a^2 - 4b^2$.
 (b) 9200.

6. (a) $12e + 32$. $6e^2 + 32e + 30$. $e^3 + 8e^2 + 15e$.

(b) 68, 180, 144.

7. $x = -6$.

8. 90.08; .09008; 900.8; No.

9. 20 lbs.

Page 374

10. $\frac{a^3}{a+b}$.11. (a) $(4x-1)(x+3)$.(b) $x(x-1)(x-6)$.(c) $2a \cdot 2b$.(d) $(a-4)(a+3)$.(e) $(3a+2)(2a+1)$.(f) $2(2+3m)(2-3m)$.12. $1, \frac{1}{4}$.

13. 96.

14. (a) $\frac{pd}{100}$. (b) a sq. yd. (c) 6.

15. 0.

16. $\frac{ad}{bc}$.17. $5xy, \frac{1}{2}x, (b-c)(c-d)$.

18. The square of the sum of a and b divided by the cube of c .

19. $\frac{1}{4}y^4 - \frac{1}{6}by^3 - \frac{5}{12}b^2y^2 + \frac{1}{3}b^3y$.20. $3 - 4y + 4y^2$. Rem. = $-4y^3$.21. -9 .

Page 375

23. $3\frac{3}{8}$.

24. 2, 4, 8, 16, 32, 64.

128, 256, 512, 1024.

25. $2^9 = 512$.

26. 1, 3, 7, 13.

It increases.

27. $8\frac{1}{3}$.

28. (a) A loss.

(b) Ran toward hunter.

(c) A decrease.

(d) Below sea level.

(e) It would fall.

29. When the subtrahend is negative.

Page 376

30. (a) $3s + 8$. (d) $A = lw$. 34. $2xy$.
 (b) $p = 4s$. (e) $p = 2(a + b)$. 35. $D = 2x + 2y$. $y = \frac{D - 2x}{2}$.
 (c) $A = s^2$. 36. 8 halves, 40 quarters.
 31. $\frac{6x^2 + 9x + 3}{5(x + 3)}$. 37. 86.8 miles.
 32. 14, 21. $95.7 - (x + y)$ miles.
 33. $2\frac{8}{9}$. 38. $c = \frac{s}{1.15}$.

Page 377

39. 16. 40. $\frac{5x + 13}{(x + 2)(x + 3)}$.

True-False

- | | | | | |
|---------------|---------------|---------------|----------------|----------------|
| 1. <i>t</i> . | 4. <i>t</i> . | 7. <i>f</i> . | 10. <i>t</i> . | 13. <i>f</i> . |
| 2. <i>f</i> . | 5. <i>f</i> . | 8. <i>t</i> . | 11. <i>f</i> . | 14. <i>f</i> . |
| 3. <i>f</i> . | 6. <i>t</i> . | 9. <i>f</i> . | 12. <i>t</i> . | 15. <i>f</i> . |
| | | | | 16. <i>f</i> . |

Page 379

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|------------|------------------------|-------------------------|---------------------------|
| 1. 0, 12. | 5. 0, $\frac{5}{2}$. | 9. 0, $-\frac{b}{a}$. | 13. 0, $\frac{7}{4}$. |
| 2. 0, -2. | 6. 0, $-\frac{2}{3}$. | 10. 0, $-\frac{1}{8}$. | 14. 0, $-\frac{3a}{14}$. |
| 3. 0, -20. | 7. 0, $\frac{1}{5}$. | 11. 0, $-\frac{7}{2}$. | 15. 0, $-\frac{1}{3}$. |
| 4. 0, 3. | 8. 0, $\frac{n}{m}$. | 12. 0, 2. | 16. 0, $\frac{10}{9}$. |

Page 380

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|-------------------------|---------------------------|-----------------------------------|-----------------------------------|
| 17. 4, -4. | 25. $\pm \frac{5b}{4}$. | 31. $\pm \frac{1}{2}\sqrt{30}$. | 39. $\pm \frac{1}{5}\sqrt{ab}$. |
| 18. ± 2 . | 26. $\pm \frac{7ac}{3}$. | 32. $\pm \frac{1}{3}\sqrt{15}$. | 40. ± 7 . |
| 19. $\pm \frac{5}{2}$. | 27. $\pm \frac{9a}{2}$. | 33. $\pm \frac{1}{2}\sqrt{3}$. | 41. $\pm \sqrt{2}$. |
| 20. $\pm \frac{7}{2}$. | 28. $\pm \frac{7ac}{8}$. | 34. $\pm \frac{1}{5}\sqrt{5}$. | 42. $\pm \frac{2}{3}\sqrt{3}$. |
| 21. $\pm \frac{2}{3}$. | 29. $\pm \sqrt{3}$. | 35. $\pm \frac{1}{10}\sqrt{70}$. | 43. ± 2 . |
| 22. $\pm \frac{1}{5}$. | 30. $\pm \sqrt{3}$. | 36. $\pm \frac{3}{2}\sqrt{10}$. | 44. $\pm \frac{1}{4}\sqrt{10}$. |
| 23. $\pm a$. | | 37. $\pm \sqrt{a}$. | 45. $\pm \frac{2}{3}\sqrt{5}$. |
| 24. $\pm \frac{b}{2}$. | | 38. $\pm \frac{1}{a}\sqrt{ac}$. | 46. 0, $\frac{1}{2}$. |
| | | | 47. $\pm \frac{3}{14}\sqrt{14}$. |

Page 380

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|-----------------------|------------------------|-----------------------|-------------------------|
| 1. 0, $\frac{1}{4}$. | 2. 0, $-\frac{3}{2}$. | 3. 0, $\frac{7}{8}$. | 4. 0, $-\frac{10}{3}$. |
|-----------------------|------------------------|-----------------------|-------------------------|

Page 381

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|--------------|---------------------------------|--------------------|
| 5. ± 5 . | 7. $\pm \frac{1}{2}\sqrt{14}$. | 9. $a, 6; b, 42$. |
| 6. ± 6 . | 8. 25 by 5 rods. | |

Page 384

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|------------|------------------------------------|---|
| 1. 3, -7. | 13. $\frac{1}{2}, -\frac{11}{2}$. | 25. 0, -13. |
| 2. 11, -1. | 14. $2, \frac{5}{12}$. | 26. 10, -14. |
| 3. 7, -5. | 15. $3, \frac{1}{3}$. | 27. $1 \pm \sqrt{3}$. |
| 4. 3, -11. | 16. $4, \frac{5}{4}$. | 28. $1, \frac{2}{3}$. |
| 5. 2, -14. | 17. $3, \frac{1}{2}$. | 29. $1, -\frac{8}{11}$. |
| 6. 7, -1. | 18. $\frac{1}{5}, -\frac{1}{2}$. | 30. $1 \pm \frac{2}{3}\sqrt{6}$. |
| 7. 6, 2. | 19. $\frac{5}{4}, -\frac{2}{3}$. | 31. $4 \pm \sqrt{6}$. |
| 8. 1, -11. | 20. 2, -4. | 32. $-2 \pm \sqrt{11}$. |
| 9. 15, -1. | 21. 1, -4. | 33. $\frac{2}{3} \pm \frac{1}{3}\sqrt{5}$. |
| 10. 5, -3. | 22. 3, -15. | 34. No. |
| 11. 6, 0. | 23. 1, -6. | 35. Yes. |
| 12. 11, 1. | 24. 6, -12. | 36. No. |

Page 385

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|--------------------------|----------------------------------|--|
| 1. $7m, m$. | 8. $\frac{3ab}{2}, -6ab$. | 12. $\frac{2}{c}, -\frac{3}{c}$. |
| 2. $3a, 3a$. | 9. $\frac{2}{a}, -\frac{5}{a}$. | 13. $\frac{b}{2}, -\frac{3b}{5}$. |
| 3. $7a, 3a$. | 10. $\frac{2 \pm \sqrt{3}}{a}$. | 14. $\frac{-b \pm \sqrt{b^2 - 4c}}{2}$. |
| 4. $a, 3a$. | 11. $4a, -6a$. | |
| 5. $5b, -2b$. | | |
| 6. $k, -2k$. | | |
| 7. $\frac{3m}{2}, -2m$. | | |

Page 388

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|----------------------------------|----------------------------------|---------------------------|------------|
| 1. 3, 5. | 7. $6, -\frac{1}{4}$. | 12. $-1, -\frac{19}{5}$. | 17. 6, -8. |
| 2. 1, -8. | 8. $\frac{5}{3}, -\frac{8}{3}$. | 13. $\frac{5}{2}, -5$. | 18. 3, 2. |
| 3. 6, -7. | 9. $\frac{1}{2}, \frac{1}{4}$. | 14. $3, -\frac{5}{3}$. | 19. 1, 2. |
| 4. 5, 6. | 10. $7, -\frac{1}{3}$. | 15. $4, -\frac{5}{3}$. | 20. 7, 4. |
| 5. $1, -\frac{1}{2}$. | 11. 2, 2. | 16. $6, -4$. | 21. 5, -3. |
| 6. $\frac{5}{3}, -\frac{8}{2}$. | | | |

Page 389

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|-------------------------------------|-----------------------------------|-------------------------------------|
| 22. $\frac{1}{3}, -\frac{3}{5}$. | 26. $3a, \frac{a}{5}$. | 28. $\frac{4n}{m}, -\frac{3n}{m}$. |
| 23. $1, \frac{1}{4}$. | 27. $\frac{c}{b}, \frac{7c}{b}$. | 29. a, b . |
| 24. $\frac{49}{16}, -5$. | | 30. $2a, -5b$. |
| 25. $\frac{4b}{a}, -\frac{b}{2a}$. | | |

Page 389

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|-----------------|-----------------|-----------------|
| 1. $-.2, -5.8.$ | 3. $-.4, -2.6.$ | 5. $5.7, -1.7.$ |
| 2. $.7, -1.2.$ | 4. $8.7, -.7.$ | 6. $7.1, -1.1.$ |

Page 390

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|-----------------|--------------------|--------------------|
| 7. $5.4, -.4.$ | 12. $.4, -.3.$ | 16. $1.25, -3.75.$ |
| 8. $4.5, -1.5.$ | 13. $2.79, -1.79.$ | 17. $.62, .08.$ |
| 9. $7.3, -.3.$ | 14. $3.19, -2.19.$ | 18. $.33, .04.$ |
| 10. $.2, -4.2.$ | 15. $3.65, -1.65.$ | 19. $2.54, .13.$ |
| 11. $.4, .2.$ | | |

Page 390

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|----------------------------------|--------------------------------|------------------------------------|
| 1. $\frac{-7 \pm \sqrt{73}}{6}.$ | 4. $1, -16.$ | 8. $m + n, \frac{m + n}{2}.$ |
| 2. $\frac{1 \pm \sqrt{129}}{8}.$ | 5. $\frac{-5 \pm \sqrt{7}}{3}$ | 9. $3 l, 3 k - 3 l.$ |
| 3. $\pm 5.$ | 6. $6, -1.$ | 10. $\frac{14 \pm 2\sqrt{74}}{5}.$ |
| | 7. $\pm 4 a.$ | |

Page 392

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|-------------------------------------|--|
| 5. $1, 1; 1, -3;$
$2, -3; 1, 3.$ | 12. $1 \pm 2\sqrt{2}; 5, -3; 3, -1; 1 \pm \sqrt{10};$
$1 \pm \sqrt{6}.$ |
| 6. $0, -4.$ | 13. $3.828, -1.828; 5, -3; 3, -1; 3.44,$
$-1.44.$ |
| 7. $2, -2.$ | 14. (a) Decreases. (b) Decreases, then increases. |
| 8. $1, 2.$ | (c) Increases. |
| 9. $\frac{1}{2}, -3.$ | 15. $\pm 2, \pm 3.1, \pm 4.4 +.$ |
| 10. $0, 0.$ | |

Page 394

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|---|---|-------------|----------|
| 1. $8.$ | 4. $6.$ | 7. $\pm 4.$ | 10. $0.$ |
| 2. $-\frac{1}{3}.$ | 5. $\frac{1}{3}.$ | 8. $6.$ | 11. $7.$ |
| 3. $63.$ | 6. $4.$ | 9. $5.$ | |
| 12. $l = \frac{32.2 t^2}{\pi^2}; 13.05 \text{ ft.}$ | 13. (a) $s = \frac{v^2}{2g}.$ (b) 257.6 ft. | | |

Page 395

- | | | |
|------------------------|------------------------|-------------------------|
| 1. $6 \& 7, -6 \& -5.$ | 4. $3 \& 5, -5 \& -3.$ | 7. $100 A, 120 A.$ |
| 2. $6, 7.$ | 5. $12, 14.$ | 8. $17.$ |
| 3. $2, 7.$ | 6. $30.$ | 9. $38¢ \text{ a doz.}$ |

Page 396

10. 12. 12. 15 by 8 ft. 14. 8, 16.
11. 12 by 8 ft. 13. 40 rods.

Page 397

15. 10. 18. 24 ft., 6 ft. 21. 12 by 12 in.
16. 42, 6. 19. 8, 10, 6. 22. 1 by 3 by 5 in.
17. 5 in. 20. 1, 3.

Page 398

23. 6 in. 26. 1.3 in. 29. $2\frac{1}{2}$ ft.
24. $2\frac{1}{2}$, 5. 27. w , 2 ft.; t , $2\frac{1}{3}$ ft. 30. 3, 4, 5 ft.
25. 6 by 10 by 6. 28. 1 in. 31. $\frac{x}{35}$ hrs., $\frac{x+15}{35}$ hrs.

Page 399

32. 3 mi. an hr. 34. 4.16 mi. per hr. 36. 5.
33. $5\frac{1}{2}$. 35. $9\frac{1}{2}$ and 10 mi. per hr.

Page 401

1. $x = 1, 5$. 9. $x = 4, -\frac{17}{4}$. 17. $x = 1, -\frac{13}{4}$.
 $y = -5, -1$. $y = 1, -\frac{7}{4}$. $y = -3, \frac{8}{5}$.
2. $x = 4, -3$. 10. $x = 6, -4$. 18. $x = 4, -\frac{18}{5}$.
 $y = 3, -4$. $y = 0, -\frac{5}{2}$. $y = -3, \frac{23}{5}$.
3. $x = 5, 3$. 11. $x = 0, 3$. 19. $x = 3, 12$.
 $y = -3, -5$. $y = -5, 4$. $y = 4, -14$.
4. $x = 5$. 12. $x = 2, -4$. 20. $x = -5.21, 2.21$.
 $y = 2$. $y = 2, -10$. $y = 8.21, .79$.
5. $x = 6$. 13. $x = 2, -\frac{6}{11}$. 21. $x = 2, -\frac{5}{2}$.
 $y = 3$. $y = 5, -\frac{57}{11}$. $y = -3, \frac{3}{2}$.
6. $x = 3, 6$. 14. $x = 2, -3$. 22. $a = 0, 2\sqrt{6}$.
 $y = -6, -3$. $y = 5, -5$. $b = 0, \sqrt{6}$.
7. $x = 7, -2$. 15. $x = 3, \frac{87}{11}$. 23. $x = \pm 2\sqrt{3}$.
 $y = 2, -7$. $y = 0, -\frac{144}{11}$. $y = \pm \sqrt{2}$.
8. $x = 4, -3$. 16. $x = 4, -\frac{9}{5}$. 24. $2 \pm \frac{1}{3}\sqrt{33}$ and
 $y = 3, -4$. $y = -1, -\frac{73}{5}$. $2 \mp \frac{1}{3}\sqrt{33}$.

Page 402

1. 4 and 11, or -11 and -4. 7. 16 by 7 ft.
2. 3 and -2. 8. 6 by 3 ft.
3. 4 and 18, or -18 and -4. 9. 7 by 2 in.
4. ± 18 and ± 12 . 10. 20 by 1 in.
5. 5 and 3, or 27 and -19. 11. 10 ft. and 15 ft.
6. 7 and 3, or 7 and -4, or -8 and 3, or -8 and -4.

Page 403

12. 78 by 36 ft. 17. 16 and 12 inches.
 13. 9 and 6 in. 18. 6.6 by 2.2 in.
 14. $6\frac{1}{2}$ by $4\frac{1}{2}$ in. 19. 8, 8, and $8\sqrt{2}$.
 15. 12 and 5 in. 20. $2\frac{2}{5}$.
 16. 8 by 6. 21. 13. 15.

Page 404

22. 2 ft., 3 ft.

Page 404

1. $A = \frac{p^2}{4\pi}$. 3. (a) $(x+5)^2$. (c) $(2k+1)(k-1)$.
 2. 402.5 feet. (b) $(2+3x)(3-5x)$. (d) $(x^{3m}+12)(x^{3m}+1)$.

Page 405

6. 57¢. 9. $\frac{x+2}{x+7}$. 11. No.
 7. 12 by 9 ft. 12. 6.
 8. (a) 3, $\frac{2}{3}$. (b) $\frac{5 \pm \sqrt{265}}{40}$. 10. 9.48 in.

Page 406

14. 5, $-\frac{5}{2}$. 22. (a) $(60+4)(60-4)$.
 15. 0. (b) $(80+2)(80-2)$.
 16. $25\sqrt{3}$ or 43.3. (c) $(20+3)(20-3)$.
 17. 11 by 6 inches.
 18. Multiplied by 4.
 Multiplied by 9.
 Divided by 4.
 19. Multiplied by 4.
 Multiplied by 9.
 Divided by 4.
 21. Greater.
 23. $s = \frac{d}{2}\sqrt{2}$.
 24. 12 and 14.
 25. $F = \frac{Df + Dd + fd}{f + D}$.
 $D = \frac{fd - fF}{F - f - d}$.
 $d = \frac{DF + fF - Df}{D + f}$.

Page 407

26. Addition or subtraction.
 28. $b = 0$.
 29. $d = \frac{8t\sqrt{H} - 8tL}{7}$.
 $t = \frac{7d}{8\sqrt{H} - 8L}$.
 30. $\frac{x^2 + 5x + 1}{(x+1)(x+2)(x-9)}$.
 31. 24.
 32. 84.
 33. 29.774.
 34. $x - 3$.
 35. 8 in., 65 in.

Page 408

36. $r = 1$.

37. No. 1 is not equal to 7.

Page 410

- | | | | | |
|--------------------|----------------------|----------------------|-----------------------|---|
| 1. $\frac{3}{5}$. | 9. $\frac{2}{1}$. | 17. $\frac{3}{2}$. | 25. $\frac{1}{4}$. | 33. $\frac{1}{5}$. |
| 2. $\frac{3}{1}$. | 10. $\frac{20}{7}$. | 18. $\frac{6}{7}$. | 26. $\frac{2}{5}$. | 34. $\frac{1}{3}$. |
| 3. $\frac{4}{3}$. | 11. $\frac{1}{4}$. | 19. $\frac{16}{1}$. | 27. $\frac{4}{5}$. | 35. $\frac{2}{3}$. |
| 4. $\frac{2}{1}$. | 12. $\frac{10}{3}$. | 20. $\frac{3}{1}$. | 28. $\frac{30}{2}$. | 36. $\frac{4}{5}$. |
| 5. $\frac{2}{1}$. | 13. $\frac{1}{8}$. | 21. $\frac{1}{8}$. | 29. $\frac{1}{4}$. | 37. $\frac{12}{25}$. |
| 6. $\frac{1}{6}$. | 14. $\frac{1}{3}$. | 22. $\frac{4}{3}$. | 30. $\frac{130}{2}$. | 38. $\frac{3}{2}$. |
| 7. $\frac{1}{2}$. | 15. $\frac{3}{2}$. | 23. $\frac{5}{12}$. | 31. $\frac{1}{8}$. | 40. $\frac{n}{2n}, \frac{4n}{7n}, \frac{3n}{10n}$. |
| 8. $\frac{1}{2}$. | 16. $\frac{1}{4}$. | 24. $\frac{32}{1}$. | 32. $\frac{1}{20}$. | |

Page 411

41. $n : 3n : 5n$.
 $2n : 5n : 8n$.
 $4n : 7n : 12n$.
42. 4.
43. $\frac{5}{2}, \frac{2}{5}, \frac{5}{14}, 30 \text{ in.}, 84 \text{ in.}, \frac{1}{7}, \text{No.}$

Page 412

- | | | |
|---------------------|----------------------|----------------------|
| 1. $\frac{9}{12}$. | 7. $\frac{8}{7}$. | 13. 6. |
| 2. $\frac{5}{6}$. | 8. $7\frac{1}{2}$. | 14. 1. |
| 3. $\frac{3}{1}$. | 9. $37\frac{1}{2}$. | 15. $\frac{4}{9}$. |
| 4. $\frac{10}{1}$. | 10. 4. | 16. -4. |
| 5. $10n/4m$. | 11. 2. | 17. $-\frac{7}{8}$. |
| 6. $2\frac{1}{2}$. | 12. 6. | 18. 9 and 27. |

Page 413

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|------------------------------------|--------------------------------------|-----------------------|
| 19. 50, 20. | 23. $108^\circ, 72^\circ$. | 26. 20 by 8 in. |
| 20. 16 and 40. | 24. $30^\circ, 60^\circ, 90^\circ$. | 27. 12 and 18. |
| 21. 60, 12. | 25. $45^\circ, 45^\circ, 90^\circ$; | 28. $\frac{15}{24}$. |
| 22. $w, \$10,000$;
s, \$6,000. | $30^\circ, 45^\circ, 105^\circ$. | |

Page 414

- | | |
|---|---|
| 1. $b' = 16, c' = 20$. | 4. $a' = 2\frac{2}{3}, b' = 6\frac{2}{3}$. |
| 2. $b' = 2\frac{1}{2}, c' = 3\frac{1}{2}$. | 5. $a' = 16, c' = 26\frac{2}{3}$. |
| 3. $a' = 15, b' = 7\frac{1}{2}$. | 6. $a' = 60, c' = 120$. |

7. $37\frac{1}{2}$ ft. 9. 12, 6.
8. 75 ft. 10. $\frac{3}{8}$ inch.

11. $BN = 4.8$; $MN = 3.6$.

1. $\frac{300}{375}, \frac{275}{450}, \frac{450}{480}; d = 3 r.$
2. $p = 4 s.$
3. $c = 12 p.$
4. $e = 6 w.$
5. $a = 7 nc.$
6. $S = 150 n.$

1. 400.

4. 600.

1. $\frac{44}{7}, \frac{88}{7}, 22, 44$. 2. 10, 25, 30, 50.

3. $\frac{1}{2}$, 1, $\frac{3}{2}$, 3, 5.
4. $\frac{1}{4}$, 1, $\frac{3}{2}$, 2, 3.
5. \$3, \$6, \$7.20, \$15.
6. 8, 4, 2, $1\frac{1}{3}$, 1, $\frac{2}{3}$.
7. 3, 2, $\frac{3}{2}$, 1, $\frac{1}{2}$.
8. .12, .10, .06, .03.

1. x .
2. y .
3. Its side.
4. Its radius.
5. The rate.
6. The number of years.
7. The principal.
8. Its width.
9. My daily wage.
10. The temperature.

1. Length and width.
2. Weekly wage and time worked.
3. Amount of money, time, and rate.
4. Length, width, and height.
5. Rate and time
6. Distance and rate.
7. x and y .
8. Attendance, study, good teaching, good book, preparation of home work each day.

Page 424

1. $x = \frac{6 - y}{2}.$

2. $x = 10 + y.$

3. $x = \frac{9 - 2y}{6}.$

4. $x = \frac{12 - 3y}{4}.$

5. $x = \frac{10 + 7y}{2}.$

6. $y = -x^2.$

7. $y = \frac{x^2 - 10}{4}.$

8. $y = 6 - 2x.$

9. $y = \frac{4x - 20}{5}.$

10. $y = x^2 + x - 6.$

11. $y = \frac{5 - 2x^2 - 4x}{2}.$

Page 425

1. $y = \frac{5}{2x}.$

3. $y = \frac{10}{2x - 1}.$

5. $y = \frac{3x + 2}{1 - 2x}.$

2. $y = \frac{6 - x}{3x}.$

4. $y = \frac{4}{6x + 1}.$

Page 425

1. $y = \pm\sqrt{-2x}.$

5. $y = \pm\sqrt{2x + 2}.$

2. $y = \pm\sqrt{2x^2 - 1}.$

6. $y = \pm\sqrt{10 - 3x}.$

3. $y = \pm\sqrt{-x^2 - 5x}.$

7. $y = \pm\sqrt{4x + 8} \text{ or } \pm 2\sqrt{x + 2}.$

4. $y = \pm\sqrt{6x - 4}.$

8. $y = \pm\sqrt{\frac{6x - 4}{3}}.$

Page 426

1. $-17\frac{7}{9}, 0, 100, -12\frac{2}{3}, -9\frac{4}{9}, -6\frac{2}{3}, 4\frac{4}{9}, -28\frac{8}{9}.$

2. Upon $t.$ 16, 64, 144, 256, 576.

3. Upon $t.$ 30, 50, 60, 80.

4. Upon $h.$ 8, 16, 24, 40, 80.

5. Upon $r.$ 44, 88, 176, 308.

6. Upon $r.$ 154, 616, 804\frac{4}{7}, 1257\frac{1}{7}.

7. 3, 4\frac{1}{2}, 6, 7\frac{1}{2}, 10\frac{1}{2}, 18.

8. 0, 2\frac{1}{2}, 6, 16, 30.

9. $y = \frac{10 - 2x}{3}; x = \frac{10 - 3y}{2}.$

10. $x = \frac{2y + 6}{3}; 2, 3\frac{1}{3}, 4\frac{2}{3}, 6, 8\frac{2}{3}.$

Page 427

6. (1). $-\frac{2}{3}, -\frac{1}{2}, -\frac{1}{6}, 0, \frac{1}{3}, 1, -1, -1\frac{1}{3}, -1\frac{1}{2}, -2$.
 (2). $1\frac{1}{2}, 1\frac{3}{8}, 1\frac{1}{6}, 1, \frac{3}{4}, \frac{1}{4}, 1\frac{3}{4}, 2, 2\frac{1}{8}, 2\frac{1}{2}$.
 (3). $2\frac{1}{2}, 2, 1, \frac{1}{2}, -\frac{1}{2}, -2\frac{1}{2}, 3\frac{1}{2}, 4\frac{1}{2}, 5, 6\frac{1}{2}$.
 (4). $-3, -2\frac{5}{8}, -2\frac{1}{2}, -2\frac{1}{3}, -2, -1\frac{1}{3}, -3\frac{1}{3}, -3\frac{2}{3}, -3\frac{5}{8}, -4\frac{1}{3}$
 (5). $4\frac{1}{2}, 6, 9, 10\frac{1}{2}, 13\frac{1}{2}, 19\frac{1}{2}, 1\frac{1}{2}, -1\frac{1}{2}, -3, -7\frac{1}{2}$.

Page 429

1. Increased, decreased, doubled, trebled, halved
 2. Increased, decreased, doubled, trebled, halved.
 3. Increased, decreased. Increased, decreased.
 4. Decreased, increased, halved, divided by 3, doubled.
 5. Decreased, increased. 7. Decreased, increased.
 6. Increased, decreased. 8. Increased, decreased.

Page 430

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|---------------|---------------|----------------|----------------|----------------|
| 1. <i>t</i> . | 5. <i>t</i> . | 9. <i>f</i> . | 13. <i>t</i> . | 17. <i>f</i> . |
| 2. <i>t</i> . | 6. <i>t</i> . | 10. <i>f</i> . | 14. <i>f</i> . | 18. <i>f</i> . |
| 3. <i>f</i> . | 7. <i>f</i> . | 11. <i>t</i> . | 15. <i>t</i> . | 19. <i>f</i> . |
| 4. <i>t</i> . | 8. <i>f</i> . | 12. <i>t</i> . | 16. <i>t</i> . | 20. <i>t</i> . |

Page 434

- | | | |
|------------|------------|-------------|
| 1. .1763. | 6. .3395. | 11. .5688. |
| 2. .2931. | 7. 1.2993. | 12. 2.2182. |
| 3. .8591. | 8. .6640. | 13. .2284. |
| 4. 2.0965. | 9. .0949. | 14. .1572. |
| 5. .6310. | 10. .4920. | 15. .4578. |

Page 435

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|-----------------------|-----------------------|------------------------|
| 1. $5^{\circ} 30'$. | 6. $36^{\circ} 3'$. | 11. $47^{\circ} 37'$. |
| 2. $10^{\circ} 30'$. | 7. $29^{\circ} 15'$. | 12. $52^{\circ} 52'$. |
| 3. $45^{\circ} 40'$. | 8. $22^{\circ} 26'$. | 13. $71^{\circ} 46'$. |
| 4. $73^{\circ} 30'$. | 9. $9^{\circ} 14'$. | 14. $78^{\circ} 14'$. |
| 5. $80^{\circ} 20'$. | 10. $42^{\circ} 5'$. | 15. $2^{\circ} 25'$. |

Page 437

- | | | |
|---------------|-------------------|------------------|
| 1. 744.98 ft. | 3. 20° . | 5. 2.3232 mi. or |
| 2. 107.42 ft. | 4. 157.76 ft. | 12266.496 ft. |

Page 438

- | | | |
|------------------|----------------|------------------------|
| 6. 7' too small. | 9. 516.35 ft. | 11. $61^{\circ} 56'$. |
| 7. 558.02 ft. | 10. 46.208 ft. | 12. 570.77 ft. |
| 8. 38'. | | |

Page 439

- | | | |
|-----------|------------------------|------------------------|
| 1. .2868. | 8. .6347. | 15. $43^{\circ} 25'$. |
| 2. .6316. | 9. .8381. | 16. $60^{\circ} 45'$. |
| 3. .9763. | 10. .0837. | 17. $29^{\circ} 33'$. |
| 4. .9959. | 11. $52^{\circ} 10'$. | 18. $18^{\circ} 34'$. |
| 5. .9094. | 12. $68^{\circ} 30'$. | 19. $50^{\circ} 59'$. |
| 6. .3376. | 13. $30^{\circ} 30'$. | 20. $64^{\circ} 14'$. |
| 7. .3939. | 14. $20^{\circ} 40'$. | |

Page 440

- | | | |
|--------------|-----------------------|------------------|
| 1. 23.1. | 3. $48^{\circ} 35'$. | 5. 61.04 ft. |
| 2. 27.51 ft. | 4. $9^{\circ} 56'$. | 6. 3.588 inches. |

Page 441

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|----------------------|-----------------------|
| 7. $13^{\circ} 7'$. | 8. $36^{\circ} 52'$. |
|----------------------|-----------------------|

Page 441

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|-----------|-----------|-----------|
| 1. .4592. | 3. .9730. | 5. .9762. |
| 2. .1536. | 4. .8725. | 6. .2114. |

Page 442

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|------------------------|-----------------------|-------------------------|
| 7. $34^{\circ} 30'$. | 12. $38^{\circ} 6'$. | 16. 1000 mi. |
| 8. $71^{\circ} 40'$. | 13. 9.120 ft. | 17. 77.467 ft. |
| 9. $66^{\circ} 18'$. | 14. 19.88 ft. | 18. 519.63 ft., 600 ft. |
| 10. $58^{\circ} 44'$. | 15. 54.96 mi. | 19. 292.7 ft. |
| 11. $51^{\circ} 41'$. | | |

Page 443

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|----------------|---|------------------------|
| 20. 1039.3 ft. | 22. (1) $B = 45^{\circ}$, $b = 60$, $c = 84.84$. | 23. $45^{\circ} 35'$. |
| 21. 4994.4 ft. | (2) $A = 60^{\circ}$, $a = 129.9$, $c = 150$. | 19.59 ft. |
| | (3) $B = 65^{\circ}$, $a = 13.99$, $c = 33.101$. | |
| | (4) $A = 38.7^{\circ}$, $B = 51.3^{\circ}$, $c = 64.07$. | |

Page 444

24. 9.374 ft., 18.69 ft.

Page 446

- | | |
|-------------------|-------------------|
| 1. 30,000 sq. ft. | 3. 5.634 sq. mi. |
| 2. 193.18. | 4. 261.96 sq. ft. |

True-False

- | | | |
|--------------|--------------|--------------|
| 1. <i>t.</i> | 2. <i>f.</i> | 3. <i>t.</i> |
|--------------|--------------|--------------|

Page 447

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|--------------|--------------|--------------|---------------|---------------|
| 4. <i>t.</i> | 6. <i>t.</i> | 8. <i>t.</i> | 10. <i>t.</i> | 12. <i>t.</i> |
| 5. <i>t.</i> | 7. <i>f.</i> | 9. <i>t.</i> | 11. <i>f.</i> | 13. <i>f.</i> |

Review

- | | | |
|--|----------------|---------------|
| 1. $15x^2 - 11xy - 12y^2$. | 3. 0, 0, 0, 0. | 6. $x + 10$. |
| 2. 60 in., 12 x in.
12($x + 4$) in. | 4. 17. | 7. 3 w ft. |
| | 5. $2x + 3$. | |

Page 448

- | | |
|------------------------------|------------------------------|
| 8. $6x^2 - 9x + 15$; 42. | 11. $Q, x + 13$; $R, -30$. |
| 9. $n, 8$; $d, 17$. | 12. $\frac{67}{144}$. |
| 10. $12(x^2 + 2xy - 6y^2)$. | 13. 13 ft. |

Page 449

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|--|--|
| 14. $6x^2 - (a^2 - 2ab + b^2)$. | 19. $x = 11$. |
| 15. (a) $8\frac{1}{3}$. (b) 134. (c) 2. | 20. $x = 10$. |
| 16. 34, 36, 38. | 21. $x = -40$. |
| 17. The sum of a and b .
b subtracted from a .
a times b .
a divided by b .
The square of a times b .
Five times the square of a
times the cube of b . | 22. $h = \frac{T - 2\pi R^2}{2\pi R}$.
23. $d = 25, 50, 75, 100, 125, 150$.
25. (a) Increased.
(b) Decreased.
(c) Decreased.
(d) Increased. |
| 18. $y = 6$. | |

Page 455

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|----------------------------|-----------|---------|------------------------|
| 1. $212^\circ, 32^\circ$. | 6. 70. | 7. 616. | 12. 929.7. |
| 2. \$928.57. | 8. 132. | | 13. 1666. |
| 3. $S = 24$; $e = 4$. | 9. 154. | | 14. 35. |
| 4. 25. | 10. 854. | | 15. $106\frac{2}{3}$. |
| 5. \$57.60. | 11. 9600. | | 16. 570, 613.4. |

Page 456

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|------------|-----------------|------------------|
| 17. 3.872. | 24. 375,000. | 30. \$2.10. |
| 18. 50. | 25. 6. | 31. 1032.5 lb. |
| 19. 108. | 26. 84 sq. in. | 32. 8.9 |
| 20. 36. | 27. 528 sq. in. | 33. 125,000. |
| 21. 42. | 28. 402 ft. | 34. 2464 sq. in. |
| 22. 32.2. | 29. \$2.60. | 35. 2156 cu. in. |
| 23. 40. | | |

Page 457

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|--------------------------------------|---|
| 1. $6x + 6y.$ | 12. $x - 5y^2 + z.$ |
| 2. $3x - 19y.$ | 13. $-9by - 16cz.$ |
| 3. $-xy - 10x.$ | 14. $3(x + y).$ |
| 4. $6x - 6y + z.$ | 15. $10(x + y) + (w - z).$ |
| 5. $5a + 6b - 8c.$ | 16. $-6(x - y) - 9(x - z).$ |
| 6. $18x + 3y + 22z.$ | 17. $16(x + 4) - 7(x - 1) + 3(x + 3)$
$= 12x + 80$ |
| 7. $11x - 5y - 10z.$ | 18. $x + y - z.$ |
| 8. $K + H.$ | 19. $\frac{1}{2}x^2 - \frac{2}{3}x + \frac{3}{2}.$ |
| 9. $10x + 9y.$ | 20. $.9a - .3b - .3c.$ |
| 10. $6x^2 - 4x - 3.$ | 21. $.68x^3 + .18x^2 - .7x + .8.$ |
| 11. $5x^2 - 13xy + 6y.$ | |

Page 458

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|-------------------------------------|--|
| 1. $2x - 8y.$ | 13. $x^3 - 4.$ |
| 2. $12x + 2y.$ | 14. $-3x^2 + 3y^2.$ |
| 3. $-4x - 14y.$ | 15. $42x^2 + 6xy - 17y^2.$ |
| 4. $-3a + 2b.$ | 16. $140x^3 + 2x^2 - 8x - 21.$ |
| 5. $-3K + 2H.$ | 17. $4x^2 + 142x + 2.$ |
| 6. $-1\frac{3}{4}x - 11y.$ | 18. $-7x^3 + 5x - 4.$ |
| 7. $-4x + 4y.$ | 19. $4x^2 + 11x - 7; 31.$ |
| 8. $-x^2 - 9xy.$ | 20. $2.8x^3 + .8x^2 - 8.9x + .9.$ |
| 9. $-2H + 15K + 8M.$ | 21. $x^3 - .09x^2 - .89x + .5.$ |
| 10. $-x^3 + x^2 + 11x + 4.$ | 22. $-\frac{1}{6}H + \frac{1}{12}K - \frac{3}{4}.$ |
| 11. $-2x^3 - 14x^2 + 7x - 18.$ | 23. $(a + b)x - 4(c + d)y$
$- 5(h + k)z.$ |
| 12. $8x^4 - 9x^3 + 4x^2 + 5x - 22.$ | |

Page 459

- $2x^6 + x^4 - 3x^2 - 10x - 8.$
- $6x^4 - 11x^3y - 14x^2y^2 + 48xy^3 - 32y^4.$
- $.14x^4 - .077x^3 - .925x^2 + 2.013x - 1.95.$

4. $.15x^4 + .205x^3 + .39x^2 + 2.1x - 1.225$.
5. $x^3 - bx^2 - x + x^2y - bxy - y$.
6. $4H^3 - 5HK^2 - 6H^2 + HK + 4H^2K - 5K^3 + 7K^2$.
7. $\frac{1}{6}x^5 - \frac{5}{36}x^4 + \frac{1}{24}x^3 - \frac{13}{120}x^2 + \frac{13}{80}x - \frac{1}{20}$.
8. $x^3a - 7x^2a + 7xa + 20$.
9. $3x^{n+1} + 4x^n - x^{n-1} - 2x^{n-2}$.
10. $12(a+b)^2 + 5(a+b)(c+d) - 25(c+d)^2 - 24(a+b)(h+k) + 30(c+d)(h+k)$.

Page 459

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|-------------------------|---|
| 1. $18x^2 + 18x + 10$. | 9. $3e - 2$; 4. |
| 2. $x^2 - 3x + 7$. | 10. $7x^2 + 5x + 4 + \frac{20x - 8}{7x^2 - 5x - 4}$. |
| 3. $2x^2 - 7x - 8$. | 11. $a + 5b$. |
| 4. $3x^2 - 2x + 1$. | 12. $.4H^2 + .2HK + .4K^2$. |
| 5. $x^2 + 11x + 28$. | 13. $\frac{3}{8}x^2 - \frac{1}{4}x - \frac{2}{3}$. |
| 6. $2m^2 - 3m + 1$. | 14. $3x^{2n} - 5x^n - 4$. |
| 7. $m + 3 + 5x$. | 15. $(a+b) + (a-b)$. |
| 8. $3t^2 - 2t + 1$. | |

Page 460

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|--------------------|---------|---------|--------------------------|
| 1. 9. | 7. -11. | 12. 7. | 17. 19. |
| 2. 1. | 8. 3. | 13. 7. | 18. -2, $-\frac{1}{4}$. |
| 3. 3. | 9. 28. | 14. 9. | 19. 3, 5. |
| 4. 5. | 10. 10. | 15. 4. | 20. 1 |
| 5. 12. | 11. 8. | 16. 11. | 21. $\frac{3}{7}$. |
| 6. $\frac{7}{2}$. | | | |

Page 461

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|--------------------------------------|---|
| 1. $(2x + 9)(2x - 9)$. | 13. $\frac{1}{5}(\frac{1}{2}x + \frac{4}{3}y)(\frac{1}{8}x - \frac{4}{3}y)$. |
| 2. $(3x + y)(3x - y)$. | 14. $(x + 3)(x - 4)$. |
| 3. $(x + 5yz)(x - 5yz)$. | 15. $(1 + 3ab)^2$. |
| 4. $x^2(x + 1)(x - 1)$. | 16. $(C + 9)(C - 6)$. |
| 5. $-x(x^2 - x + 1)$. | 17. $(a - 5)(a + 4)$. |
| 6. $2(2 + 3m)(2 - 3m)$. | 18. $(3a + 2)(2a + 1)$. |
| 7. $r^2s^2(1 + 2r^2)(1 - 2r^2)$. | 19. $(m - 7)(m + 6)$. |
| 8. $a^2b^2(5b + 4a)(5b - 4a)$. | 20. $(2s - 5w)^2$. |
| 9. $2a(a + y^2)(a - y^2)$. | 21. $(x - 12)(x + 11)$. |
| 10. $a^3(b + 9)(b - 9)$. | 22. $(a - 8)(a - 2)$. |
| 11. $2Pr(r + h)$. | 23. $(2a + b)(a - b)$. |
| 12. $(10x^2 + 7y^3)(10x^2 - 7y^3)$. | 24. $(m - 9)(m - 2)$. |

25. $(a + 3b)(2a - b)$.
 26. $(3p + q)(2p - q)$.
 27. $(C - 3)(C + 2)$.
 28. $(5x - 2y)(x - y)$.
 29. $(2a + 3b)^2$.
 30. $(x + 6)(x - 4)$.
 31. $(4a + b)(a - 4b)$.
 32. $4(x + 3)^2$.
 33. $(2 + 3c)(6 - c)$.
 34. $(a + 6)(a - 8)$.
 35. $(6m + 5n)^2$.
 36. $(x^2 + 4)^2$.
 37. $(5x + 4)(2x + 3)$.
 38. $C(n - 1)$.
 39. $2x(5x + 7)(3x + 4)$.
 40. $3(x + 11)(x - 3)$.
 41. $3(x + 3)(2x - 5)$.
 42. $2(x + 5)^2$.
 43. $(3x + 2)(x + 1)$.
 44. $(8x - 5)(7x - 9)$.
 45. $x(10 + 11x)(3 - 7x)$.
 46. $a(x - 3y)^2$.
 47. $-1(1 + 3x)^2$.
 48. $(3H + 2)(H - 1)$.
 49. $(3c + 4)(4c - 3)$.
 50. $a(x - 10)(x + 7)$.
 51. $(2x + y)(x + 7y)$.
 52. $y(x + 5y)(x - 5y)$.
 53. $7y^2(2x + y)(2x - y)$.
 54. $(x + 1 - 5)^2 = (x - 4)^2$.
 55. $(a + x + 3)^2$.
 56. $(1 + x - y)(1 - x + y)$.
 57. $(2a + 2b + 3b + 3c)$
 $(2a + 2b - 3b - 3c) =$
 $(2a + 5b + 3c)(2a - b - 3c)$.
 58. $(x + \frac{1}{3})(x + \frac{1}{2})$.

Page 462

1. $(x + .5)(x - .5)$.
 2. $(.4x + .7y)(.4x - .7y)$.
 3. $(x + 1.5y)(x - 1.5y)$.
 4. $(.4x + .3y)(.4x - .3y)$.
 5. $(x + .9)^2$.
 6. $(x - .4)^2$.
 7. $.12(x - 1)^2$.
 8. $(.3y + .04z)(.3y - .04z)$.
 9. $(x - .4)(x - .5)$.
 10. $(x - .7)^2$.
 11. $8.6(y^2 + z^2)$.
 12. $(.5x + \frac{1}{4}y)(.5x - \frac{1}{4}y)$.
 13. $(.9x + 1.3y)(.9x - 1.3y)$.
 14. $.4(x - 2)^2$.
 15. $.7(x - 1)^2$.
 16. $.8y(y^2 + 1)(y + 1)(y - 1)$.
 17. $2(3x - .4)(x - .3)$.
 18. $(x - 1)(.02x - 7)$.
 19. $(.3x + .4y)^2$.
 20. $(.7x + .8y)^2$.
 21. $(.5x - .8)^2$.
 22. $(7H - .9)^2$.
 23. $.3(x + 5y)(x - 5y)$.
 24. $(H - .7)(H + .4)$.
 25. $(1.1H + .8K)(1.1H - .8K)$.
 26. $(H - .2)(H - 2)$.
 27. $.7(x - 2)(x - 1)$.
 28. $(3.5H^2 + .8K^2)(3.5H^2 - .8K^2)$.
 29. $(1.2H - .5K)^2$.
 30. $.003(H^m + 4K^n)(H^m - 4K^n)$.

Page 462

1. $(x^a + y^b)(x^a - y^b)$.
 2. $(x^{2a} + 6)(x^{2a} - 6)$.
 3. $(x^{3a} + 3)(x^{3a} - 3)$.
 4. $x^a(3 + 6y)$.
 5. $5x^a(1 + 3y^2)$.
 6. $2(x^a + 4y^b)(x^a - 4y^b)$.
 7. $3(x^{2a} + 6)(x^{2a} - 6)$.
 8. $(2x^m + 3y^{2n})(2x^m - 3y^{2n})$.

9. $6(x^a + 3)(x^a - 3)$.
 10. $(7x^a + 6y^b)(7x^a - 6y^b)$.
 11. $(x^a + 1)^2$.
 12. $(x^a + 4)(x^a + 3)$.
 13. $(x^{2a} + 5)(x^{2a} + 4)$.
 14. $(x^{2a} - 4)(x^{2a} - 5)$.
 15. $(x^a + 2)(x^a + 9)$.
 16. $(5 - x^a)^2$.
 17. $10(x^a + 5)(x^a - 2)$.
 18. $(3x^a + 4y^b)(2x^a - 5y^b)$.
 19. $(x^{4a} + 9)(x^{4a} - 6)$.
 20. $(\frac{1}{2}H^x + \frac{1}{3}K^y)(\frac{1}{2}H^x - \frac{1}{3}K^y)$.

Page 463

1. $\frac{2}{15}, \frac{2}{15}, \frac{8}{15}, \frac{6}{5}$.
 2. $\frac{47y}{42}, -\frac{23y}{42}, \frac{5y^2}{21}, \frac{12}{35}$.
 3. $\frac{37HK}{28}, \frac{5HK}{28}, \frac{3H^2K^2}{7}, \frac{21}{16}$.
 4. $\frac{7}{6x}, \frac{1}{6x}, \frac{1}{3x^2}, \frac{4}{3}$.
 5. $\frac{34}{15x^2}, \frac{16}{15x^2}, \frac{1}{x^4}, \frac{25}{9}$.
 6. $\frac{9x^2 + 32y^2}{12xy}, \frac{9x^2 - 32y^2}{12xy}, 2, \frac{9x^2}{32y^2}$.
 7. $\frac{5x - y}{x^2 - y^2}, \frac{5y - x}{x^2 - y^2}, \frac{6}{x^2 - y^2}, \frac{2(x + y)}{3(x - y)}$.
 8. $\frac{9x + y}{40}, \frac{-x - 9y}{40}, \frac{x^2 - y^2}{80}, \frac{4(x - y)}{5(x + y)}$.
 9. $\frac{x^2 + 2xy - y^2}{xy}, -\frac{x^2 + y^2}{xy}, \frac{x^2 - y^2}{xy}, \frac{y(x - y)}{x(x + y)}$.
 10. $\frac{2a}{a^2 - b^2}, \frac{-2b}{a^2 - b^2}, \frac{1}{a^2 - b^2}, \frac{a - b}{a + b}$.
 11. 0. 12. $\frac{44}{5y}$. 13. $\frac{37x}{72}$. 14. $\frac{11y}{90}$. 15. $\frac{5y^2}{14}$.
 16. $\frac{2x^3 + 3y^3 + 2y}{x^2y^2}$. 20. $\frac{x^2 + 2x - 1}{x + 1}$. 24. $\frac{(x + y)^2}{x^2 + y^2}$.
 17. $\frac{21}{28 - y}$. 21. $\frac{x^2 + 2x}{x + 1}$. 25. $\frac{-15x^2 + 16x - 1}{5x - 2}$.
 18. $\frac{3}{9 - y}$. 22. $\frac{x^2}{x - 1}$. 26. $\frac{3b^2}{b^2 - 1}$.
 19. $\frac{x^2 + 2x + 3}{x + 1}$. 23. $\frac{x + 1}{x - 3}$. 27. $\frac{1}{x - 2}$.

Page 464

28. $\frac{2xy}{9x^2 - 4y^2}$. 30. $\frac{2x - 24}{x^2 - 4x + 3}$. 32. 0.
 29. $\frac{6}{a + 2}$. 31. $\frac{6 - 30a}{a^2 - 9}$. 33. $\frac{a - 1}{2a}$.

34. $\frac{y}{x}$.

36. $\frac{x^2(x-z)}{yz}$.

38. $\frac{2a+1}{2a+3}$.

35. $3y^2(y-5)(3y-7)$.

37. 1.

39. $\frac{a^2+b^2}{a}$.

40. x .

Page 465

41. $a+b$.

44. $\frac{x^2-y^2}{xy^2}$.

46. $\frac{3x^2}{x^2-1}$.

42. 1.

43. $a-3$.

45. $\frac{1}{2x^2-1}$.

47. $\frac{3-x}{4+x}$.

Page 465

1. 6.

4. 49 b .

7. $\frac{5+2a}{2}$.

9. $\frac{12b}{7}$.

2. $\frac{9-24c}{2}$.

5. 18 b .

6. 2 ac .

8. $\frac{5}{a+b}$.

10. $\frac{7b}{2}$.

3. 0.

Page 466

11. $\frac{5H-3K}{H-K}$.

16. $\frac{11H-6K}{5}$.

21. a .

12. $-\frac{m}{n}$.

17. $\frac{4a-3b}{1+a-b}$.

22. 4 a .

13. $-\frac{K}{H}$.

18. $-\frac{5a}{34}$.

23. $\frac{2K-H}{1+K-H}$.

14. $\frac{ab}{b-a}$.

19. $\frac{19a^2+5}{8}$.

24. $a+2b$.

15. $-2ab$.

20. $\frac{48-15a^2}{25}$.

25. $\frac{K^2+2HK+H^2}{H^2-KH}$.

Page 466

1. $x=3, y=2$.

3. $x=-1, y=17$.

5. $x=3, y=-3$.

2. $x=8, y=23$.

4. $x=-3, y=7$.

6. $x=1, y=1$.

Page 467

7. $x=.2, y=.3$.

9. $x=15, y=25$.

11. $x=3, y=6$.

8. $x=12, y=-4$.

10. $x=13, y=-1$.

12. $x=4, y=-3$.

Page 467

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|-------------------------------|-----------------------------|--|-------------------------|
| 1. $13\sqrt{3}$. | 3. $\frac{11}{3}\sqrt{3}$. | 5. $\frac{13}{2}\sqrt{2}$. | 7. $(2a + b)\sqrt{6}$. |
| 2. $13\sqrt{6}$. | 4. 0. | 6. $11\sqrt{3}$. | 8. $17\sqrt{2}a$. |
| 9. $(4a - 3b)\sqrt{a - 3b}$. | | 13. $6 + \sqrt{6}$. | 14. $40 - 25\sqrt{2}$. |
| 10. $\sqrt{15} - 24$. | | 15. $a\sqrt{a} + b\sqrt{b}$. | |
| 11. $15\sqrt{2} - 12$. | | 16. $12\sqrt{2} + 36 - 11\sqrt{6} - 4\sqrt{3}$. | |
| 12. $20b - 2a + 3\sqrt{ab}$. | | 17. $6\sqrt[3]{2}$. | |

Page 468

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|--------------------|-------------------------|----------------------|
| 1. 12, 13, 14, 15. | 5. 19, 7. | 9. 26, 27, 28. |
| 2. 11, 13, 15, 17. | 6. 12. | 10. $\frac{1}{18}$. |
| 3. 66, 74. | 7. 9, 15. | 11. $\frac{5}{8}$. |
| 4. 45, 32. | 8. $28\frac{1}{8}$ min. | |

Page 469

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|----------------------------------|-------------------|-------------|------------------------|
| 12. $\frac{8}{17}$. | 14. \$490, \$760. | 16. 38, 40. | 18. <i>N</i> , 164 ft. |
| 13. $\frac{3}{4}, \frac{3}{8}$. | 15. 32, 33. | 17. 89. | <i>Z</i> , 360 ft. |
| | | | <i>Y</i> , 1500 ft. |

Page 470

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|---------------------------|---------------------------|-----------------------------------|
| 19. <i>H</i> , 25,080 ft. | 21. <i>S</i> , \$100,000. | 23. \$7200. |
| <i>S</i> , 48,840 ft. | <i>C</i> , \$50,000. | 24. <i>M</i> , 12; <i>E</i> , 14. |
| 20. <i>N. J.</i> , 8224. | <i>T</i> , \$30,000. | 25. <i>F</i> , 16; <i>H</i> , 24. |
| <i>T</i> , 265896. | 22. \$14,000 @ 5%. | 26. 24. |
| | \$6000 @ 6%. | |

Page 471

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|----------------------------------|---|---|
| 27. 29 each. | 29. <i>d</i> , 7; <i>q</i> , 30. | 31. 36 feet. |
| 28. <i>h</i> , 15; <i>d</i> , 4. | 30. <i>q</i> , 5; <i>d</i> , 25; <i>n</i> , 75. | 32. 180 sq. ft. |
| | 33. 60 by 40 ft. | 35. 35 ft. |
| | 34. 780 by 430 ft. | 36. <i>R</i> , 9 by 1; <i>S</i> , 3 by 3. |

Page 472

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|---------------------------|-----------------------------|--|
| 37. 18 days. | 40. $66\frac{2}{3}$ pounds. | 43. <i>m</i> , 12 qt; <i>c</i> , 6 qt. |
| 38. $1\frac{1}{5}$ hours. | 41. $\frac{1}{8}$ gallon. | 44. 30 mi. an hr. |
| 39. 1 hour. | 42. 4 qts. | |

Page 473

45. $1\frac{1}{3}$ hours. 47. $22\frac{1}{2}$ miles. 49. 6 hours.
 46. $1\frac{3}{4}$ hours. 48. 24 miles. 50. 7 hours.

Page 473

1. $\frac{m}{c}$ hours.

Page 474

2. $S + C$; $S - C$. 7. $\frac{100c}{p}$ cents. 11. $\frac{z}{16}$.
 3. $2n + 3$; $2n + 5$. 8. $\frac{4x}{5}$ dollars. 12. $\frac{d}{n}$ dollars.
 4. $\frac{k}{m-s}$. 9. $\left(\frac{x}{4} + \frac{5}{12}\right)$ feet. 13. $\frac{ec}{b}$. 14. $\frac{c}{36}$.
 5. $2x - 15 = \frac{5}{2}(x - 9)$. 10. 16 p ounces. 15. $y - 6$.
 6. 24 d hours.

Page 475

16. $d + \frac{c}{100}$. 20. $2n + 2$; $2n + 4$.
 17. bc sq. in.
 $(2b + 2c)$ inches. 21. (a) $100h + 10t + u$.
 $100u + 10t + h$.
 18. xy ; $2x + 2y$. (b) $36(e - s)$.
 19. $P\left(1 + \frac{r}{20}\right)$. 22. $4(y - 3) = 2(y + 5)$.
 23. $12b - 12c - d$.

Page 475

1. 3, $-\frac{7}{2}$. 3. $\frac{1}{3}$, $-\frac{3}{2}$. 5. 7, -2.
 2. $\frac{a}{5}$, $-\frac{a}{2}$. 4. 3, $\frac{2}{3}$. 6. 5.7; -3.7.

Page 476

7. 2.8; -10.8. 9. .24; -4.24.
 8. .3; -2.3. 10. 2.78; .72.

Page 476

1. 10, -2. 5. 2 inches.
 2. 9, 6 or $-\frac{23}{8}$, $-\frac{23}{2}$. 6. 6 in.
 3. 45 by 60 ft. 7. 11.347 in. No.
 4. 11.273 by 7.273.

Page 477

8. (a) 12 mi. per hr. (b) 24 mi. per hr.

Page 477

1. $F = \frac{3}{5}C + 32$.
 2. $l = \frac{2S - na}{n}$.
 3. 6.93; 13.8; Doubled.
 4. (a) $\frac{3}{2}$. (b) $M = \frac{Lt + g}{t}$.
 5. $v = \sqrt{2gh}$; 40.
 6. $F = \frac{2Ms}{t^2}$.
 7. (a) $h = \frac{2A}{b + b'}$. (b) $b = 4$.

Page 478

8. $\pm 7, 0, \pm \frac{1}{4}\sqrt{2}$.
 9. 4, 3; $\frac{1}{3}, -\frac{1}{2}; \frac{3 \pm \sqrt{-21}}{3}$.
 10. (a) $s = \frac{Rg}{g - R}$. (b) 9.33.
 11. (a) $H = \frac{T - 2\pi R^2}{2\pi R}$. (b) 2.7.
 12. (a) $t = \frac{2S + a}{2a}$. (b) 13.5
 13. $S = L - \frac{dL}{100}$.
 14. (a) $r = \frac{E - CR}{C}$. (b) 2.8.

Page 479

15. $2LH + 2WH$; WL .
 16. $S = C + \frac{rC}{100}$.

Page 479

1. $m = n^2$.
 2. $y = x^2 - 1$.
 3. $y = 2x^2$.
 4. $y = x^2 + x$.
 5. $y = x^2 - 2$.
 6. $c = n^2 + 1$.

Page 480

7. $n = \frac{m^2}{2}$.
 8. $y = \frac{3}{2}x$.
 9. $c = a^2 + b^2$.

Page 480

1. $a = \frac{2A}{b + c}$.
 2. $x^4 + x^2 + x + 2$.
 3. $-y - w$.
 4. -180 .
 5. 17 ft.; 289 sq. ft.

Page 481

9. 18.
 10. 8 and 5.
 11. $x^8 - 1$.
 12. $x - 3$.
 13. $x + 7$.
 14. $(x^2 + 1)(x + 1)^2(x - 1)^2(x - 2)$.
 15. (a) 0. (b) -3. (c) 6.
 16. 160.
 17. 8, -7.
 18. $2x^3 - 5x + 5 - ax^2$.

Page 482

22. $5\frac{1}{2}$ mi. per hr. 24. $\frac{(m-n)^2}{m^2-n^2}$. 25. $\frac{a}{b-1}$.
23. $2a + 1$.
26. $(x^2 + y^2 + ab)(x^2 + y^2 - ab)$.
27. $H.C.F. = 2x - y$.
 $L.C.M. = (2x - y)(x + y)(3x + 2y)$.
28. $\frac{1}{c-d}$.
29. $m = 3$. 31. $c = 2$.
30. $k = 12$. 32. $29 - 47m + 30m^2 - 9m^3 + m^4$.
33. -5 .
34. $-4k + r + x$. 35. $x = 5$. 36. $\frac{n-4}{n+1}$.

Page 483

38. 179. 42. .00029.
40. 12 boys. \$4. 43. $x = a, y = b$.
41. 18 boys. \$120. 44. $x = \frac{4}{3}, -2$. $y = 2, -3$.

Page 484

45. $n, 12; q, 6; d, 4$. 49. $(2x)^2 - 2x^2$. 54. $x = 3, -\frac{3}{5}$.
 $y = 1, -\frac{7}{5}$.
46. $\frac{c}{2(c+2)}$. 50. $l - 5, l + 5, 5l, \frac{l}{5}$. 55. $x = 6, -\frac{3}{5}$.
 $y = 1, -9$.
47. $x = \frac{1}{a}, y = \frac{1}{b}$. 51. 35¢, 3¢ a word. 56. $x = \pm 3$.
 $y = \pm 2$.
48. Coefficient, exponent,
index, denominator. 53. $x = 10$ or 1 .
 $y = -\frac{5}{3}$ or $-\frac{2}{3}$.

Page 485

57. $x = 1, -5$. 59. $x = 5, -11$. 61. $x = \frac{2}{3}, -3$.
 $y = 5, -1$. $y = 2, -6$. $y = \frac{3}{2}, 7$.
58. $x = \frac{5}{2}, -1$. 60. $x = 2, -\frac{1}{3}$.
 $y = -\frac{4}{5}, 2$. $y = 4, \frac{5}{3}$.

Page 485

1. Inversely. 4. $3n, 5n, 8n$.
2. 1. 12, 20, 32.
3. Greater. 5. a^6 .

Page 486

6. $\pm(a - 3b)$. 12. Doubled, halved, trebled.
8. $x = 4, y = 3$. 15. Increased, increased, decreased.
9. (a) f . (b) t . 17. 1 to 10.
10. $\frac{x}{y} = \frac{4}{3}$. 18. $x = 8, -\frac{2}{5}$.
 $y = 1, -\frac{2}{5}$.

Page 487

19. 120 ft.
 20. No. When reduced.
 21. .2 or -2.9.
 22. (a) f . (b) t . (c) t .
 23. $\cos x$.
 25. $t = \pm \sqrt{\frac{V - 50}{10}} = \pm \frac{1}{10} \sqrt{10V - 500}$.
 26. $y = 6, 7, 8, 9$.
 $y = x + 2$. Decreases.
 27. $.866^2 + .5^2 = .999956 = 1$.
 28. $\cos A = \pm \sqrt{1 - \sin^2 A}$.
 $\cos A = \pm 1, \pm \frac{1}{2}\sqrt{3}, \pm \frac{1}{2}, 0$.
 29. $x = 3, -2$.
 $y = 2, -3$.
 30. $x = \frac{5y - 2}{3}$.

Page 488

31. 9.
 32. $\frac{a + b}{a - b}$.
 33. The number.
 34. $x = \frac{1}{a}, -\frac{6}{a}$.
 35. .9.
 36. $h = 5, 15, 13, 26, 41, 17, 10, 20, 8$.

Page 489

37. 4.5.
 38. 240.
 39. $\frac{x + 2y}{x - 3y}$.
 40. $\frac{x}{x - y}$.
 42. Decreases.
 43. $p, 18; w, 42$.
 44. Twice either an even or odd number is always even.
 45. $s, 4; f, 32$.
 46. $t; t$ and r .
 47. Doubled, doubled, quadrupled, no change.
 48. 25.9 ft.

Page 490

1. $-3x^2 + 5x - 6$.
 2. $a^2 - (7b - 9)$.
 3. $93\frac{1}{3}$.
 4. $l = \frac{v}{hw}$.
 5. $\frac{ns - r}{n}$.
 6. $3(2a + 3b)(2a - 3b)$.
 7. $x^2 = 9y^2 + 12y + 4$.
 8. $x = 1$.

Page 491

9. $a = \frac{d + 3c}{7}$.
 10. $3ab\sqrt{6}$.
 11. -5.
 12. $x = \frac{1}{2}, -3$.
 13. 3.7.
 14. $y = 5$.
 15. Decreases.
 16. 30.
 17. $100m^2 - 20n + 1$.
 18. $x = 4, y = 2$.
 19. $\frac{d}{3} - \frac{d}{5} = 25$.

